9-2320-260-34-1

TM 9-2320-260-34-1
T.O. 36A12-1C-432-2-1

TECHNICAL MANUAL
VOLUME 1 OF 2

TROUBLESHOOTING

DIRECT SUPPORT AND GENERAL SUPPORT LEVEL

5-TON, 6X6, M809 SERIES TRUCKS
(DIESEL)

TRUCK, CHASSIS: M809, M809A1, M810, M811, M811A1, M811A2, M812; TRUCK, CHASSIS, ROCKET LAUNCHER: M812A1; TRUCK, CARGO: M813, M813A1, M814; TRUCK, BOLSTER, LOGGING: M815; TRUCK, WRECKER, MEDIUM: M816; TRUCK, DUMP: M817; TRUCK, TRACTOR: M818; TRUCK, TRACTOR, WRECKER: M819; TRUCK, VAN, EXPANSIBLE: M820, M820A1, M820A2; TRUCK, STAKE, BRIDGE TRANSPORTING: M821

DEPARTMENTS OF THE ARMY AND THE AIR FORCE

DECEMBER 1980

D 101.11:

READEX FICHE best copy available

WARNING

EXHAUST GASES CAN BE DEADLY

Exposure to exhaust gases produces symptoms of headache, dizziness, loss of muscular control, apparent drowsiness, and coma. Permanent brain damage or death can result from severe exposure.

Carbon monoxide occurs in the exhaust fumes of fuel burning heaters and internal combustion engines, and becomes dangerously concentrated under conditions of inadequate ventilation. The following precautions must be observed to insure the safety of personnel whenever fuel burning heater(s) or engine of any vehicle is operated for maintenance purposes or tactical use.

Do not operate heater or engine of vehicle in an enclosed area unless it is adequately ventilated.

Do not idle engine for long periods without maintaining adequate ventilation in personnel compartments.

Do not drive any vehicle with inspection plates or cover plates removed unless necessary for maintenance purposes.

Be alert at all times during vehicle operation for exhaust odors and exposure symptoms. If either are present, immediately ventilate personnel compartments. If symptoms persist, remove affected personnel from vehicle and treat as follows: expose to fresh air; keep warm; do not permit physical exercise; if necessary, administer artificial respiration.

If exposed, seek prompt medical attention for possible delayed onset of acute lung congestion. Administer oxygen if available.

The best defense against exhaust gas poisoning is adequate ventilation.

WARNING

Serious or fatal injury to personnel may result
if the following instructions are not complied with.

Smoking, flames, sparks and glowing or hot objects are not allowed within 50 feet of work area during maintenance of fuel system components. Fuel can explode, causing injury to personnel and damage to equipment.

Only properly trained personnel should perform test on 115 volt system. The voltage present in 115 volt system can cause severe or fatal electric shock.

Do not drive truck until the low air pressure warning buzzer is silent and the air pressure gage shows at least 65 PSI. This is the minimum pressure required for safe braking action.

Do not use hand throttle to drive the vehicle.

Do not park truck with front transmission gearshift lever in gear.

*TM 9-2320-260-34-1
T.O. 36A12-1C-432-2-1

Technical Manual
No. 9-2320-260-34-1
Technical Order
No. 36A12-1C-432-2-1

DEPARTMENTS OF THE ARMY
AND
THE AIR FORCE
WASHINGTON, D.C. 31 DECEMBER 1980

TECHNICAL MANUAL

VOLUME 1 OF 2

TROUBLESHOOTING

DIRECT SUPPORT AND GENERAL SUPPORT LEVEL

5-TON, 6X6, M809 SERIES TRUCKS

(DIESEL)

Model		NSN Without Winch	NSN With Winch
Chassis	M809	2320-00-050-8842	2320-00-050-8841
Chassis	M809A1		2320-00-050-8941
Chassis	M810	2320-00-051-0586	2320-00-051-0585
Chassis	M811	2320-00-050-8986	2320-00-050-8985
Chassis	M811A1		2320-00-050-8989
Chassis	M811A2	2320-00-050-9005	
Chassis	M812		2320-00-050-9011
Chassis, Rocket Launcher	M812A1		2320-00-050-9040
Truck, Cargo	M813	2320-00-050-8902	2320-00-050-8890
	M813A1	2320-00-050-8913	2320-00-050-8905
	M814	2320-00-050-8988	2320-00-050-8987
Truck, Bolster, Logging	M815		2320-00-050-8927
Truck, Wrecker, Medium	M816		2320-00-051-0489
Truck, Dump	M817	2320-00-050-8970	2320-00-051-0589
Truck, Tractor	M818	2320-00-050-8984	2320-00-050-8978
Truck, Tractor, Wrecker	M819		2320-00-050-9004
Truck, Van, Expansible	M820	2320-00-050-9006	
	M820A1	2320-00-050-9007	
	M820A2	2320-00-050-9010	
Truck, Stake, Bridge Transporting	M821	2320-00-050-9015	

Current as of 31 December 1980

*This manual supersedes TM 9-2320-260-34-1, 5 October 1972, including all changes.

REPORTING OF ERRORS AND RECOMMENDING IMPROVEMENTS

You can help improve this manual. If you find any mistake or if you know of a way to improve the procedure, please let us know. Mail your letter, DA Form 2028 (Recommended Changes to Publication and Blank Forms), or DA Form 2028-2 located in the back of this manual direct to: Commander, U.S. Army Tank Automotive Materiel Readiness Command, ATTN: DRSTA-MB, Warren, Michigan 48090. A reply will be furnished to you.

TABLE OF CONTENTS

VOLUME 1 of 2

		Paragraph	Page
CHAPTER 1.	GENERAL INFORMATION		
	Scope	1-1	1-1
	Organization	1-2	1-1
	Troubleshooting Approach	1-3	1-1
CHAPTER 2.	TROUBLESHOOTING APPROACH		
	General Approach	2-1	2-1
	Troubleshooting Index	2-2	2-1
	Test Equipment Procedures Index	2-3	2-1
	Troubleshooting Roadmaps	2-4	2-1
	Fault Symptom Index	2-5	2-1
	Sample Troubleshooting Procedure	2-6	2-1
CHAPTER 3.	TROUBLESHOOTING INDEX		
	General	3-1	3-1
	Index	3-2	3-1
CHAPTER 4.	TEST EQUIPMENT PROCEDURES INDEX		
	General	4-1	4-1
	Index	4-2	4-1
CHAPTER 5.	TROUBLESHOOTING ROADMAPS		
	General	5-1	5-1
	Roadmaps	5-2	5-1
CHAPTER 6.	FAULT SYMPTOM INDEXES		
	General	6-1	6-1
	Indexes	6-2	6-2
CHAPTER 7.	SAMPLE TROUBLESHOOTING PROCEDURE		
	General	7-1	7-1
	Sample Detailed Procedure	7-2	7-1
CHAPTER 8.	ENGINE SYSTEM TROUBLESHOOTING		
	Equipment Items Covered	8-1	8-1
	Equipment Items Not Covered	8-2	8-1
CHAPTER 9.	CLUTCH SYSTEM TROUBLESHOOTING		
	Equipment Items Covered	9-1	9-1
	Equipment Items Not Covered	9-2	9-1

TABLE OF CONTENTS–CONT

		Paragraph	Page
CHAPTER 10.	FUEL SYSTEM TROUBLESHOOTING		
	Equipment Items Covered	10-1	10-1
	Equipment Items Not Covered	10-2	10-1
CHAPTER 11.	FUEL SYSTEM TROUBLESHOOTING SUMMARY		
	General	11-1	11-1
	Procedures	11-2	11-1
CHAPTER 12.	FUEL SYSTEM SUPPORT DIAGRAMS		
	General	12-1	
CHAPTER 13.	FUEL SYSTEM TEST PROCEDURES		
	General	13-1	13-1
	Test Set-up	13-2	13-1
	Test Procedure	13-3	13-1
CHAPTER 14.	FUEL FRESSURE GAGE CHECK		
	Equipment Items Covered	14-1	14-1
	Equipment Items Not Covered	14-2	14-1
CHAPTER 15.	FUEL SYSTEM CHECKOUT PROCEDURES		
	General	15-1	15-1
CHAPTER 16.	FRONT AXLE SYSTEM TROUBLESHOOTING		
	Equipment Items Covered	16-1	16-1
	Equipment Items Not Covered	16-2	16-1
CHAPTER 17.	FRONT AXLE SYSTEM TROUBLESHOOTING SUMMARY		
	General	17-1	17-1
	Procedures	17-2	17-1
CHAPTER 18.	FRONT AXLE SYSTEM SUPPORT DIAGRAMS		
	General	18-1	18-1
CHAPTER 19.	FRONT AXLE SYSTEM TEST PROCEDURES		
	General	19-1	19-1
	Test Set-up	19-2	19-1
	Test Procedure	19-3	19-1
CHAPTER 20.	REAR AXLE SYSTEM TROUBLESHOOTING		
	Equipment Items Covered	20-1	20-1
	Equipment Items Not Covered	20-2	20-1
CHAPTER 21.	ELECTRICAL SYSTEM TROUBLESHOOTING		
	Equipment Items Covered	21-1	21-1
	Equipment Items Not Covered	21-2	21-1
CHAPTER 22.	ELECTRICAL SYSTEM SUPPORT DIAGRAMS		
	General	22-1	22-1
CHAPTER 23.	BRAKE SYSTEM TROUBLESHOOTING		
	Equipment Items Covered	23-1	23-1
	Equipment Items Not Covered	23-2	23-1
CHAPTER 24.	BRAKE SYSTEM SUPPORT DIAGRAMS		
	General	24-1	24-1
CHAPTER 25.	STEERING SYSTEM TROUBLESHOOTING		
	Equipment Items Covered	25-1	25-1
	Equipment Items Not Covered	25-2	25-1

TABLE OF CONTENTS–CONT

		Paragraph	Page
CHAPTER 26.	STEERING SYSTEM TROUBLESHOOTING SUMMARY		
	General	26-1	26-1
	Procedures	26-2	26-1
CHAPTER 27.	STEERING SYSTEM SUPPORT DIAGRAMS		
	General	27-1	27-1
CHAPTER 28.	VAN TAILGATE SYSTEM TROUBLESHOOTING		
	Equipment Items Covered	28-1	28-1
	Equipment Items Not Covered	28-2	28-1
CHAPTER 29.	VAN TAILGATE SYSTEM TROUBLESHOOTING SUMMARY		
	General	29-1	29-1
	Procedures	29-2	29-1
CHAPTER 30.	VAN TAILGATE SYSTEM SUPPORT DIAGRAMS		
	General	30-1	30-1
CHAPTER 31.	VAN TAILGATE SYSTEM TEST PROCEDURES		
	General	31-1	31-1
	Test Set-up	31-2	31-1
	Test Procedure	31-3	31-1
CHAPTER 32.	VAN TAILGATE SYSTEM CHECKOUT PROCEDURES		
	General	32-1	32-1
CHAPTER 33.	M815 MIDSHIP WINCH SYSTEM TROUBLESHOOTING		
	Equipment Items Covered	33-1	33-1
	Equipment Items Not Covered	33-2	33-1
CHAPTER 34.	FRONT WINCH SYSTEM TROUBLESHOOTING		
	Equipment Items Covered	34-1	34-1
	Equipment Items Not Covered	34-2	34-1
CHAPTER 35.	M816 WRECKER SYSTEM TROUBLESHOOTING		
	Equipment Items Covered	35-1	35-1
	Equipment Items Not Covered	35-2	35-1
CHAPTER 36.	M816 WRECKER SYSTEM TROUBLESHOOTING SUMMARY		
	General	36-1	36-1
	Procedures	36-2	36-1
CHAPTER 37.	M816 WRECKER SYSTEM SUPPORT DIAGRAMS		
	General	37-1	37-1
CHAPTER 38.	M819 WRECKER SYSTEM TROUBLESHOOTING		
	Equipment Items Covered	38-1	38-1
	Equipment Items Not Covered	38-2	38-1
CHAPTER 39.	M819 WRECKER SYSTEM TROUBLESHOOTING SUMMARY		
	General	39-1	39-1
	Procedures	39-2	39-1

TABLE OF CONTENTS–CONT

		Paragraph	Page
CHAPTER 40.	M819 WRECKER SYSTEM SUPPORT DIAGRAMS		
	General	40-1	40-1
CHAPTER 41.	M819 WRECKER SYSTEM TEST PROCEDURES		
	General	41-1	41-1
	Test Set-up	41-2	41-1
	Test Procedure	41-3	41-1
CHAPTER 42.	M819 WRECKER SYSTEM CHECKOUT PROCEDURES		
	General	42-1	42-1

VOLUME 2 OF 2

Part 1 of 5

CHAPTER 1.	GENERAL MAINTENANCE INFORMATION	
CHAPTER 2.	ENGINE OVERHAUL	
Section I.	Scope	2-1
Section II.	Disassembly	2-1
Section III.	Cleaning, Inspection, and Repair	2-78
Section IV.	Assembly	2-298
Section V.	Run-In, Tests, and Adjustments	2-436
Section VI.	Final Assembly	2-492
CHAPTER 3.	ENGINE SYSTEM GROUP MAINTENANCE	
Section I.	Scope	3-1
Section II.	Engine Assembly	3-1
Section III.	Crankcase, Block, and Cylinder Head	3-68
Section IV.	Crankshaft	3-91
Section V.	Flywheel	3-103
Section VI.	Pistons and Connecting Rods	3-108
Section VII.	Valves, Camshaft, and Timing System	3-123
Section VIII.	Engine Lubricating System	3-182
Section IX.	Manifolds	3-219
Section X.	Accessory Drive System	3-234
CHAPTER 4.	CLUTCH SYSTEM GROUP MAINTENANCE	
Section I.	Scope	4-1
Section II.	Clutch Assembly Removal, Repair, and Replacement	4-1
Section III.	Clutch Release Mechanism	4-11

Part 2 of 5

CHAPTER 5.	FUEL SYSTEM GROUP MAINTENANCE	
Section I.	Scope	5-1
Section II.	Fuel Injector	5-1
Section III.	Fuel Pump	5-96
Section IV.	Fuel Tanks. Lines, and Fittings	5-252

TABLE OF CONTENTS–CONT

		Paragraph	Page
CHAPTER 6.	COOLING SYSTEM GROUP MAINTENANCE		
Section I.	Scope		6-1
Section II.	Radiator		6-1
Section III.	Water Manifold and Thermostat Housing		6-10
Section IV.	Water Pump		6-32
CHAPTER 7.	ELECTRICAL SYSTEM GROUP MAINTENANCE		
Section I.	Scope		7-1
Section II.	Charging System		7-1
Section III.	Starting System		7-1
Section IV.	Engine Safety Controls		7-1
Section V.	Instrument Panel Components		7-4
Section VI.	Battery System		7-8
Section VII.	Cab and Chassis Wiring Harnesses		7-8
CHAPTER 8.	TRANSMISSION SYSTEM GROUP MAINTENANCE		
Section I.	Scope		8-1
Section II.	Transmission Assembly		8-1
CHAPTER 9.	TRANSMISSION TRANSFER SYSTEM GROUP MAINTENANCE		
Section I.	Scope		9-1
Section II.	Transmission Transfer Assembly		9-1
Section III.	Transmission Transfer Controls and Linkage		9-121
CHAPTER 10.	FRONT AXLE GROUP MAINTENANCE		
Section I.	Scope		10-1
Section II.	Front Axle Assembly		10-1
Section III.	Steering Mechanism		10-14

Part 3 of 5

CHAPTER 11.	REAR AXLE GROUP MAINTENANCE		
Section I.	Scope		11-1
Section II.	Rear Axle Assembly		11-1
Section III.	Differential Carrier Assembly		11-8
CHAPTER 12.	BRAKE SYSTEM		
Section I.	Scope		12-1
Section II.	Handbrake Assembly		12-1
Section III.	Service Brake Assembly		12-8
Section IV.	Hydraulic Brake System		12-12
Section V.	Mechanical Brake System		12-43
Section VI.	Compressed Air System		12-50
CHAPTER 13.	WHEEL SYSTEM GROUP MAINTENANCE		
Section I.	Scope		13-1
Section II.	Tires		13-1

TABLE OF CONTENTS–CONT

		Paragraph	Page
CHAPTER 14.	STEERING SYSTEM GROUP MAINTENANCE		
Section I.	Scope		14-1
Section II.	Mechanical Steering Gear Assembly		14-1
Section III.	Power Steering Gear Assembly		14-11
Section IV.	Hydraulic Pump Assembly		14-49
Section V.	Hydraulic Cylinders		14-65
CHAPTER 15.	FRAME AND TOWING ATTACHMENTS GROUP MAINTENANCE		
Section I.	Scope		15-1
Section II.	Frame Assembly		15-1
Section III.	Fifth Wheel Assembly		15-59
CHAPTER 16.	BODY, CAB, AND HOOD GROUP MAINTENANCE		
Section I.	Scope		16-1
Section II.	Hood and Cab Components		16-1
Section III.	Fenders, Running Boards, and Windshield Assembly		16-92
Section IV.	Seats		16-108
Section V.	Cargo Bodies Components		16-124
Section VI.	Special Purpose Bodies		16-187

Part 4 of 5

CHAPTER 17.	WINCH, HOIST, CRANE, AND POWER TAKEOFF ASSEMBLIES GROUP MAINTENANCE		
Section I.	Scope		17-1
Section II.	Winch, Hoist, and Crane Assemblies		17-1
Section III.	Power Takeoff Assembly		17-981

Part 5 of 5

CHAPTER 18.	BODY ACCESSORY ITEM GROUP MAINTENANCE		
Section I.	Scope		18-1
Section II.	Canvas Accessory Items		18-1
CHAPTER 19.	MAINTENANCE OF MATERIAL USED IN CONJUNCTION WITH MAJOR ITEMS		
Section I.	Scope		19-1
Section II.	Winterization Kits		19-1
Section III.	Deep Water Fording Kit		19-229
Section IV.	Special Purpose Kits		19-262

CHAPTER 1

GENERAL INFORMATION

1-1. SCOPE. This volume tells you how to do troubleshooting at the direct and general support levels of maintenance. The amount of troubleshooting you can do is based on what the Maintenance Allocation Chart says you can fix. Because of this, the only trouble symptoms you will find here are those that could be caused by faulty things you can fix.

1-2. ORGANIZATION. This volume has the information you will need to troubleshoot the truck. Chapter 2 tells you how to use the information in the other chapters of this volume to find what is wrong with the truck, and what you must do to fix it. Chapter 7 has a procedure that takes you step-by-step through a sample trouble-shooting procedure and shows you how to use the information to find the trouble and fix it.

1-3. TROUBLESHOOTING APPROACH. In order to find out what is causing the problem in the truck, you must use a good approach. A good approach just means a way of doing troubleshooting so you can find the problem and not get confused or lost. The following chapter describes how you can use the materials in this volume to troubleshoot with a good approach.

CHAPTER 2

TROUBLESHOOTING APPROACH

2-1. GENERAL APPROACH. This chapter gives you instructions on how to use the troubleshooting material to help you find and fix the trouble. In every system of the truck there can be faults or problems which will cause certain symptoms. Symptoms can be such things as unusual noise, vibration, or even complete failure of a system. This volume gives information for each system on which you can do troubleshooting to find faults and fix them. Before you troubleshoot a system, you should look at the troubleshooting indexes which will lead you to the information you need to help make your troubleshooting faster and easier. If you follow the instructions the right way, you will find those troubles you can fix. But, if you fix something and the trouble is still there, it means there is more than one trouble. If this happens, start all over again to find the other trouble.

2-2. TROUBLESHOOTING INDEX. The troubleshooting index, and instructions on how to use it are in chapter 3. Go to this index first because it tells you where to find troubleshooting roadmaps, fault symptom indexes, summary troubleshooting charts and support diagrams for each system.

2-3. TEST EQUIPMENT PROCEDURES INDEX. The test equipment procedures index, and instructions on how to use it are in chapter 4. This index tells you where to find electrical and mechanical tests which you can use to do your troubleshooting. It also tells you what equipment you will need to do the tests. If you have a STE/ICE (Simplified Test Equipment/Internal Combustion Engine) Set (NSN 4910-00-124-2554), you may use it, where applicable, to do your troubleshooting. Refer to TM 9-4910-571-12 & P.

2-4. TROUBLESHOOTING ROADMAPS. Troubleshooting roadmaps for each system are in chapter 5. If the system is made up of subsystems, these subsystems are also on the roadmap. Under the subsystem is a list of things which are the most likely causes of a fault symptom in that subsystem. If you have enough skill, you can troubleshoot these things on the truck without using the detailed troubleshooting procedures. So if you know enough about the truck to work on your own, use the roadmap for the system with the problem before you check the fault symptom index.

2-5. FAULT SYMPTOM INDEX. Fault symptom indexes and instructions on how to use them are in chapter 6. For each system of the truck, there is an index which gives you a list of the fault symptoms for that system. The index also tells you where to find the detailed troubleshooting procedures and what resources (tools/people) you need to do each procedure.

2-6. SAMPLE TROUBLESHOOTING PROCEDURE. A sample troubleshooting procedure is in chapter 7. This sample procedure will help you see the way detailed troubleshooting procedures are to be used.

CHAPTER 3

TROUBLESHOOTING INDEX

3-1. GENERAL. This chapter has a troubleshooting index which covers every system of the truck on which you can do troubleshooting. The index tells you where to find all the other information you need to do your troubleshooting procedures.

3-2. INDEX. The troubleshooting index (fig. 3-1) is divided into five columns that list systems, troubleshooting roadmaps, fault symptoms, summary troubleshooting procedures, and system support diagrams. The following breakdown tells you what is in each column.

a. System Column. This column gives a list of systems on the truck for which troubleshooting can be done at direct support level of maintenance.

b. Troubleshooting Roadmaps Column. This column tells you where to find the troubleshooting roadmap for each listed system. These roadmaps are given in chapter 5.

c. Fault Symptom Index Column. This column tells you where to find the troubleshooting fault symptom index for each listed system. Fault symptom indexes are given in chapter 6.

d. Summary Troubleshooting Procedures Column. This column tells you where to find the summary troubleshooting procedure for each listed system. Some systems do not have summary troubleshooting procedures, so the column will be left blank for those systems.

e. System Support Diagrams Column. This column tells you where to find support diagrams for each listed system. Some systems do not have support diagrams, so the column will be left blank for those systems.

	SYSTEM	TROUBLE-SHOOTING ROADMAPS	FAULT SYMPTOM INDEXES	SUMMARY TROUBLE-SHOOTING PROCEDURES	SYSTEM SUPPORT DIAGRAMS
1	ENGINE	Figure 5-1	Table 6-1		
2	CLUTCH	Figure 5-2	Table 6-2		
3	FUEL	Figure 5-3	Table 6-3	Figure 11-1	Figure 12-1
4	FRONT AXLE	Figure 5-4	Table 6-4	Figure 17-1	Figure 18-1
5	REAR AXLE	Figure 5-5	Table 6-5		Figure 18-1
6	ELECTRICAL	Figure 5-6	Table 6-6		Figure 22-1/9
7	BRAKE	Figure 5-7	Table 6-7		Figure 24-1
8	STEERING	Figure 5-8	Table 6-8	Figure 26-1	Figure 27-1
9	VAN TAILGATE	Figure 5-9	Table 6-9	Figure 29-1	Figure 30-1
10	M815 MIDSHIP WINCH	Figure 5-10	Table 6-10		
11	FRONT WINCH	Figure 5-11	Table 6-11		
12	M816 WRECKER	Figure 5-12	Table 6-12	Figure 36-1	Figure 37-1
13	M819 WRECKER	Figure 5-13	Table 6-13	Figure 39-1	Figure 40-1

Figure 3-1. Troubleshooting Index

TA 118128

CHAPTER 4

TEST EQUIPMENT PROCEDURES INDEX

4-1. GENERAL. This chapter has a test equipment procedures index which tells you where to find the tests you need to do your troubleshooting.

4-2. INDEX. The test equipment procedures index is divided into three columns that list test equipment, tests, and figure numbers. The following breakdown tells you what is in each column.

a. Test Equipment Column. This column tells you what kind of equipment you need to do your troubleshooting tests.

b. Tests Column. This column tells you what tests are given in this manual. Next to each piece of test equipment are listed the tests that you can do with that equipment. This column also gives troubleshooting tests which can be done without using test equipment.

c. Figure Column. This column tells you where you can find the tests in this manual.

TEST EQUIPMENT		TESTS	FIGURE
1	MULTIMETER AN/URM-105C SIMPSON 160 TS-352B/U	Refer to TM 9-2320-260-20-2	
2	GAGE–fuel system pressure P/N 11600036	1. Fuel Pump Pressure	13-1
		2. Pressure Gage	14-1
3		3. Fuel Pump Flow	15-1
		4. Steering Knuckle End Play	19-1
		5. Expansible Van Tailgate Hydraulic	
		Pump and AC Motor Pump	31-1
		6. Lifting Cylinder Pressure	31-2
		7. Swing motor swivel valve	
		pressure (M819 Wrecker)	41-1

Figure 4-1. Test Equipment Procedures Index

TA 118129

CHAPTER 5

TROUBLESHOOTING ROADMAPS

5-1. GENERAL. This chapter gives troubleshooting roadmaps for every system of the truck for which you have detailed troubleshooting procedures. Figures 5-1 through 5-13 cover all the roadmaps for the detailed procedures.

5-2. ROADMAPS. Each roadmap gives a list of things which are most likely to cause a fault symptom in a system or subsystem. At least one of the items listed will be found to be bad when you do the detailed troubleshooting procedures for that system.

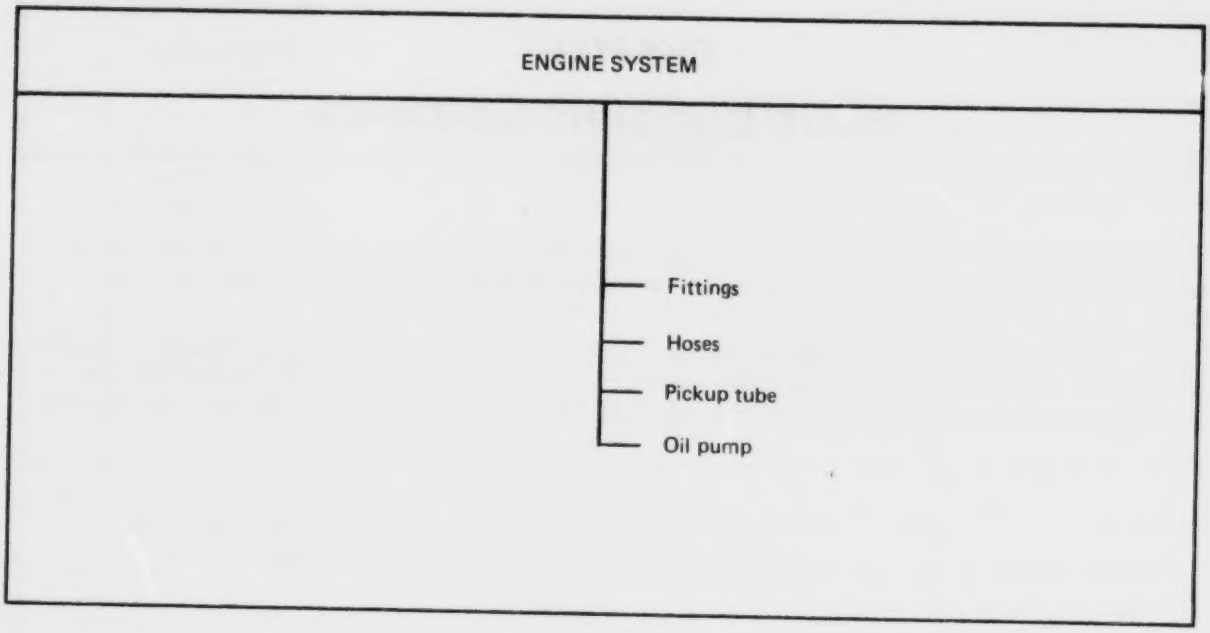
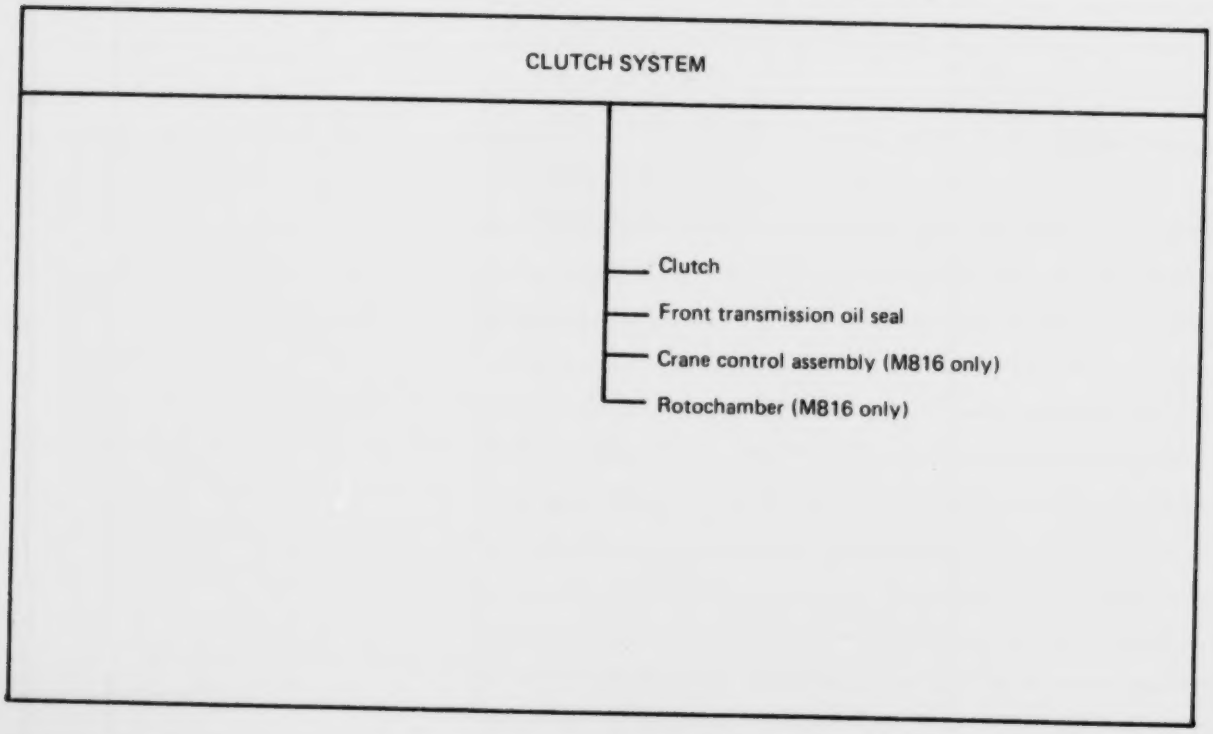


Figure 5-1. Troubleshooting Roadmap, Engine System



TA 118130

Figure 5-2. Troubleshooting Roadmap, Clutch System

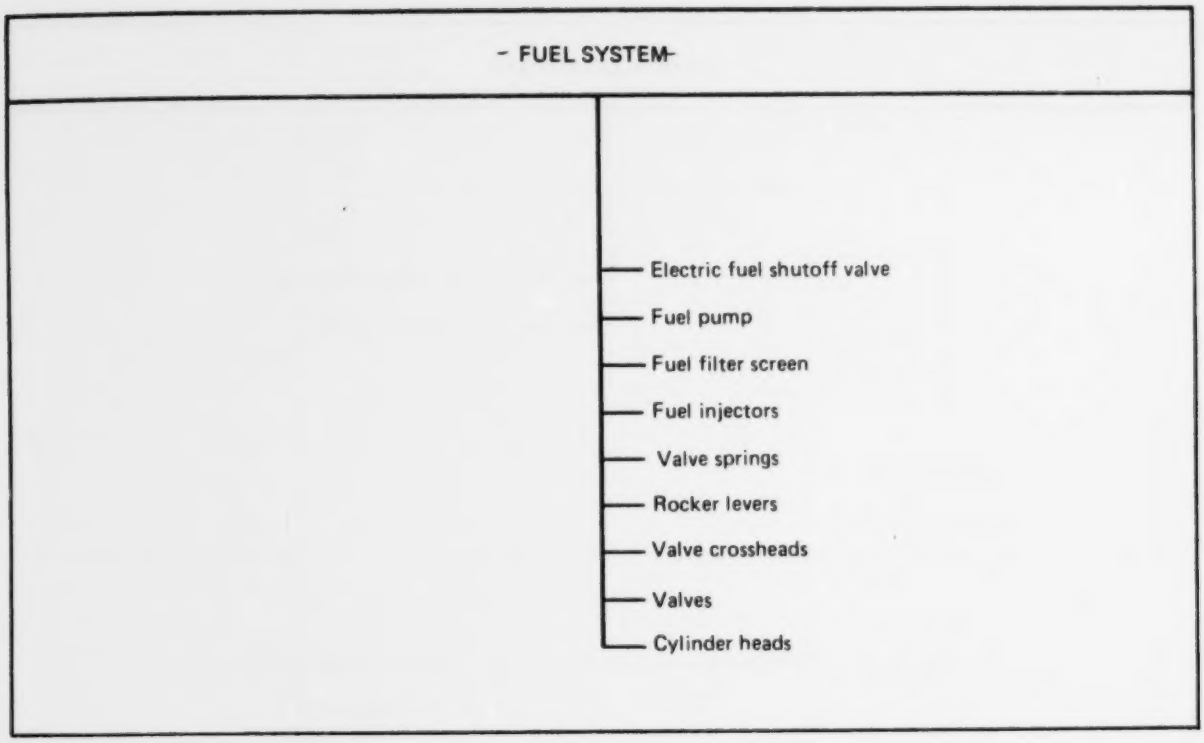
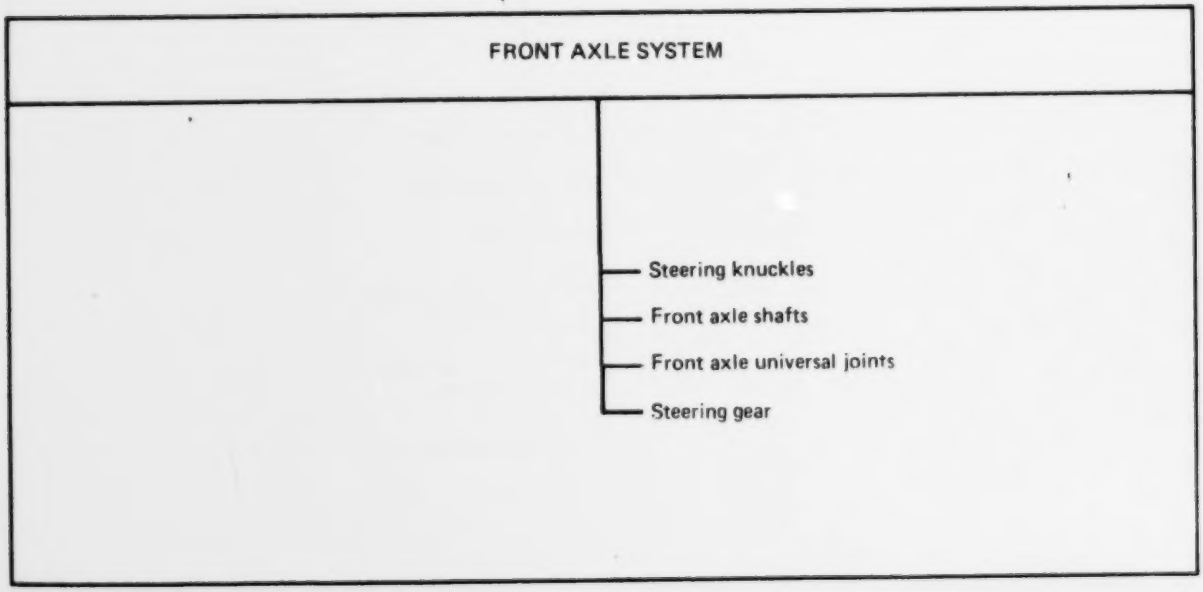


Figure 5-3. Troubleshooting Roadmap, Fuel System



TA 118131

Figure 5-4. Troubleshooting Roadmap, Front Axle System

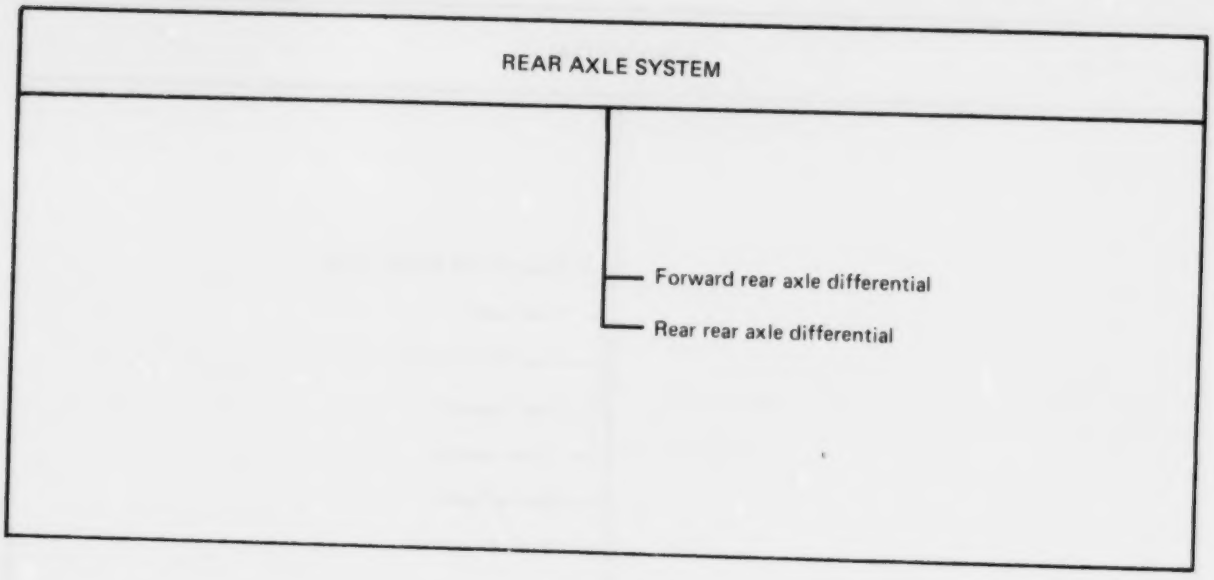


Figure 5-5. Troubleshooting Roadmap, Rear Axle System

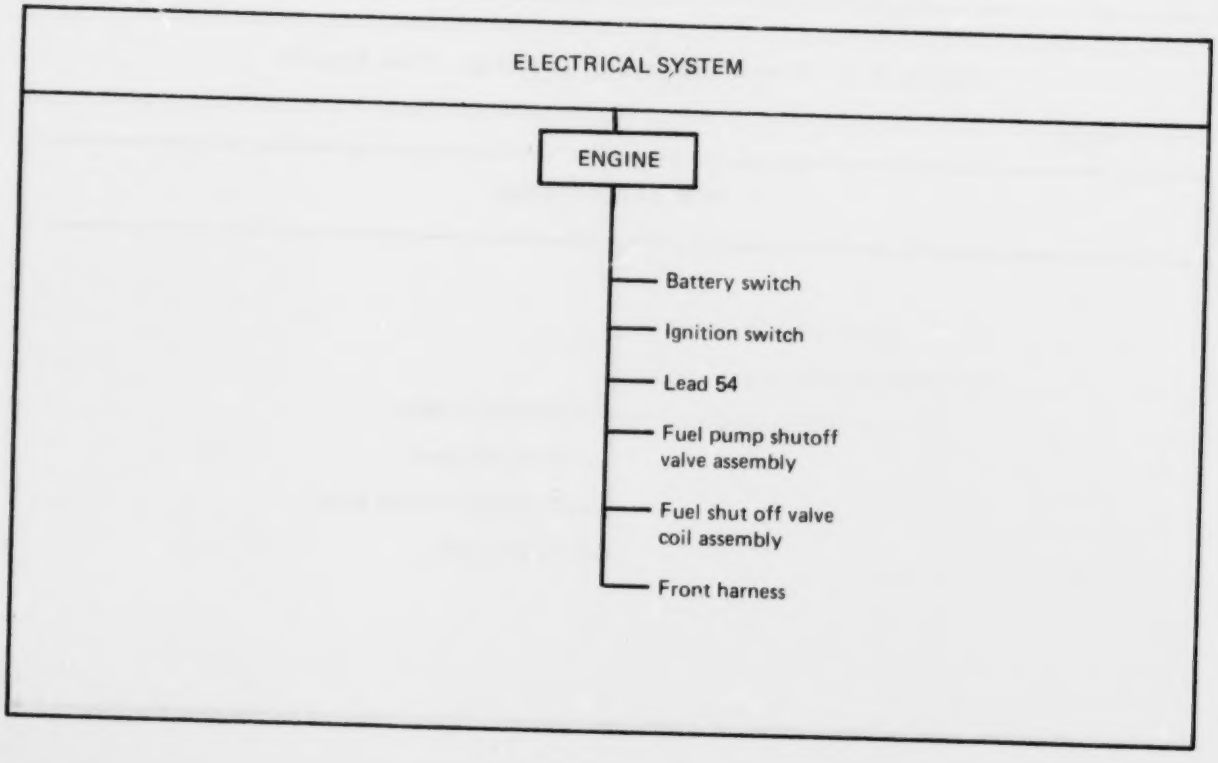
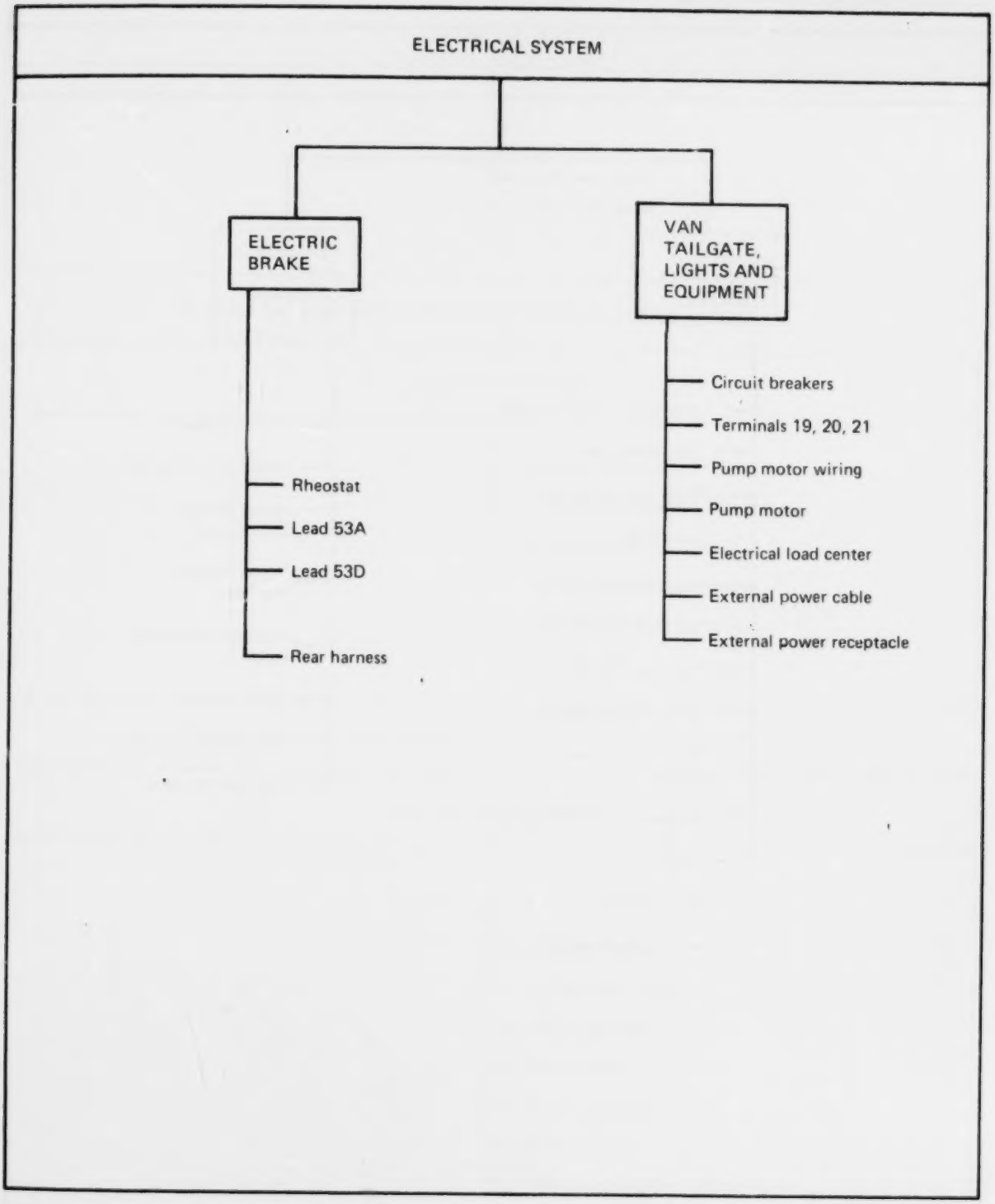


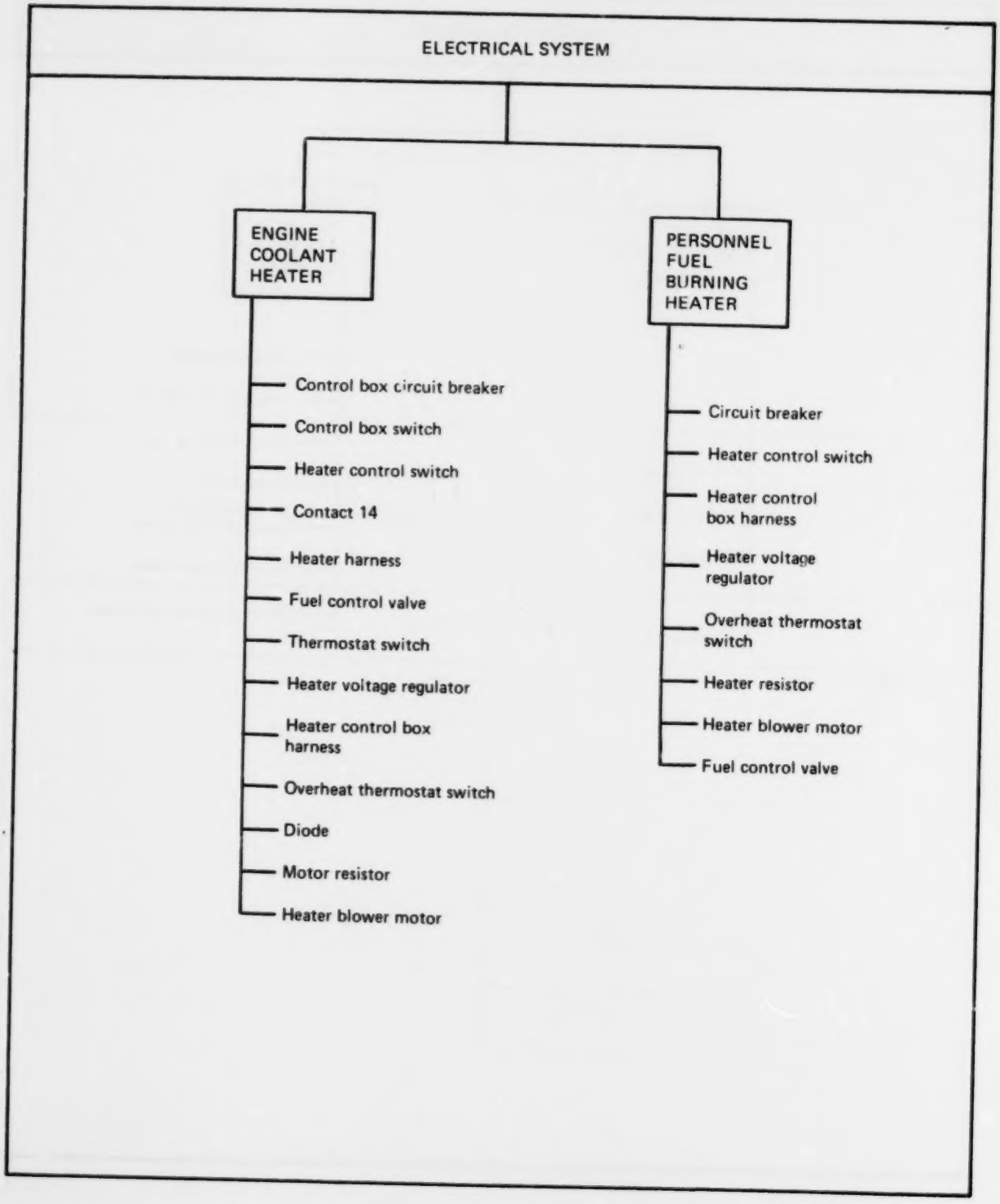
Figure 5-6. Troubleshooting Roadmap, Electrical System (Sheet 1 of 3)

TA 118132



TA 118133

Figure 5-6. Troubleshooting Roadmap, Electrical System (Sheet 2 of 3)



TA 118134

Figure 5-6. Troubleshooting Roadmap, Electrical System (Sheet 3 of 3)

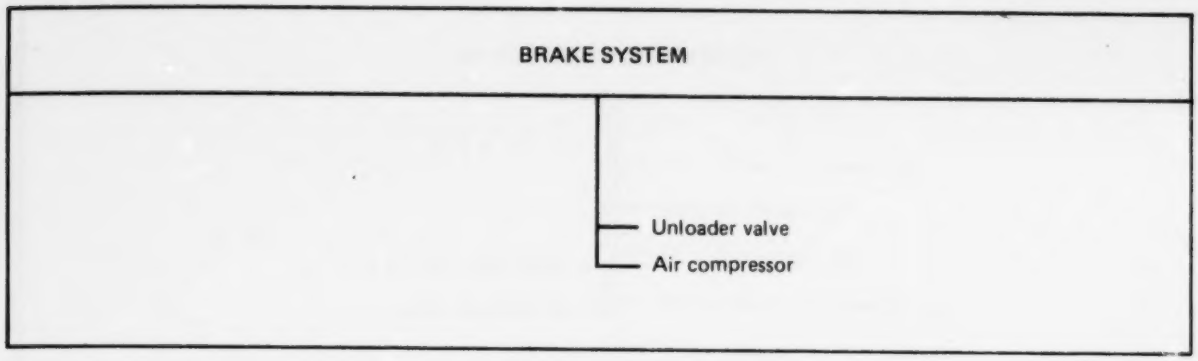


Figure 5-7. Troubleshooting Roadmap, Brake System

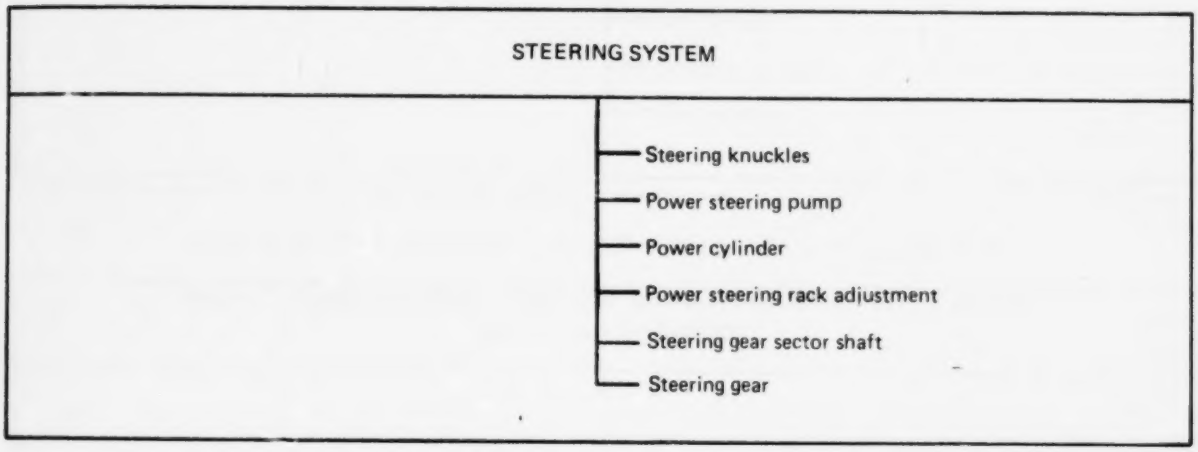
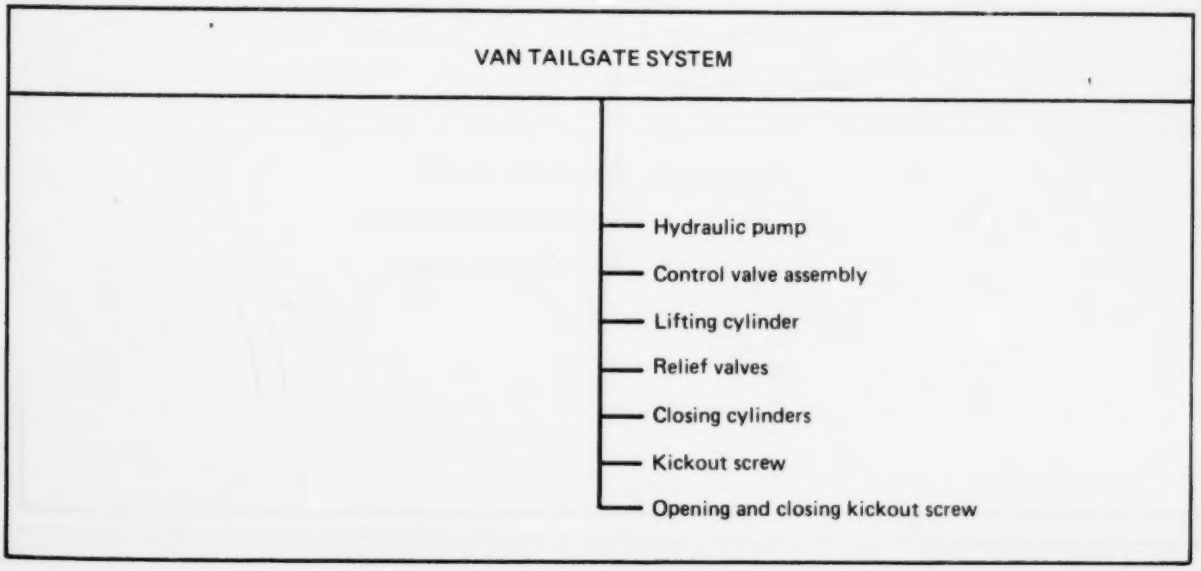


Figure 5-8. Troubleshooting Roadmap, Steering System



TA 118135

Figure 5-9. Troubleshooting Roadmap, Van Tailgate System

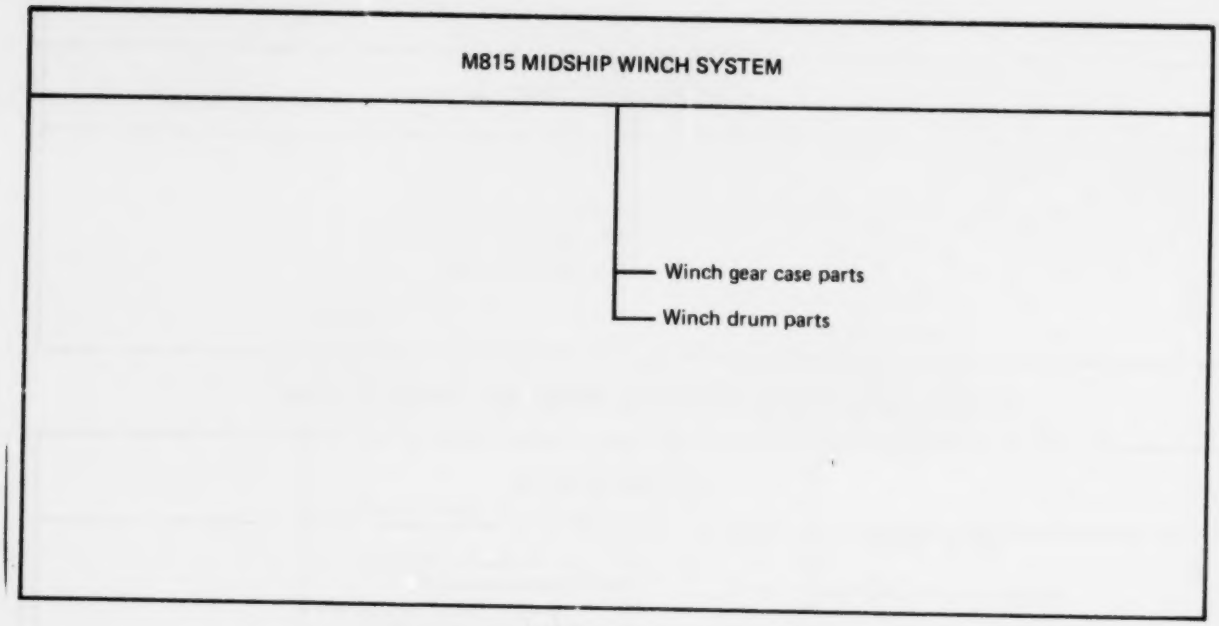
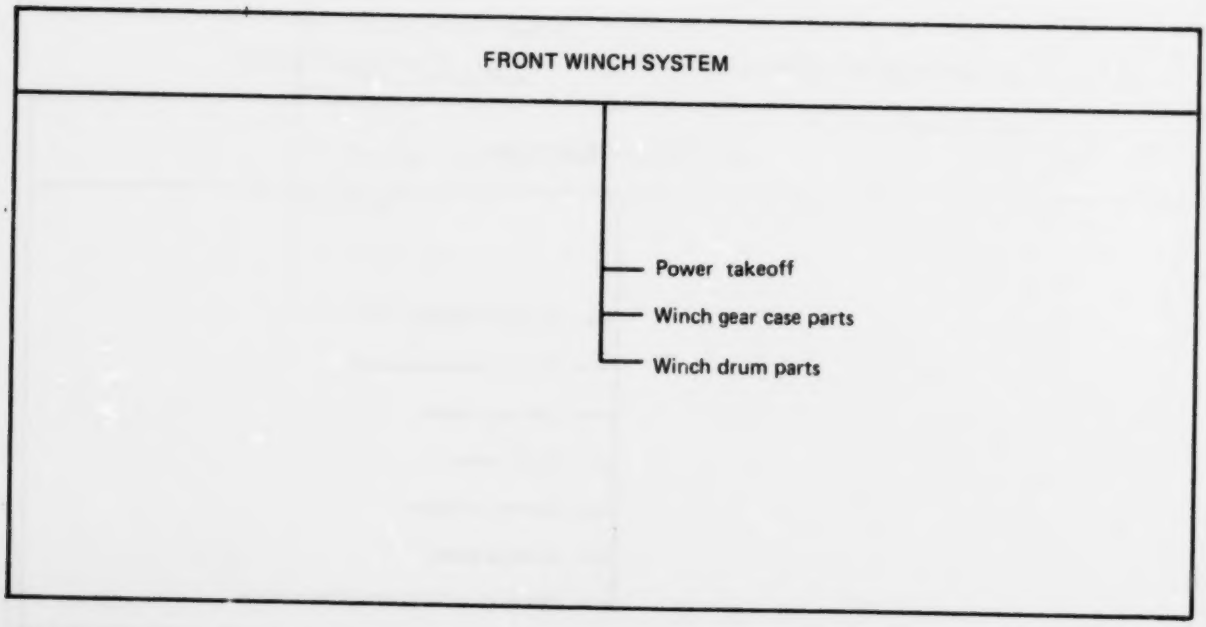


Figure 5-10. Troubleshooting Roadmap, Midship Winch System



TA 118136

Figure 5-11. Troubleshooting Roadmap, Front Winch System

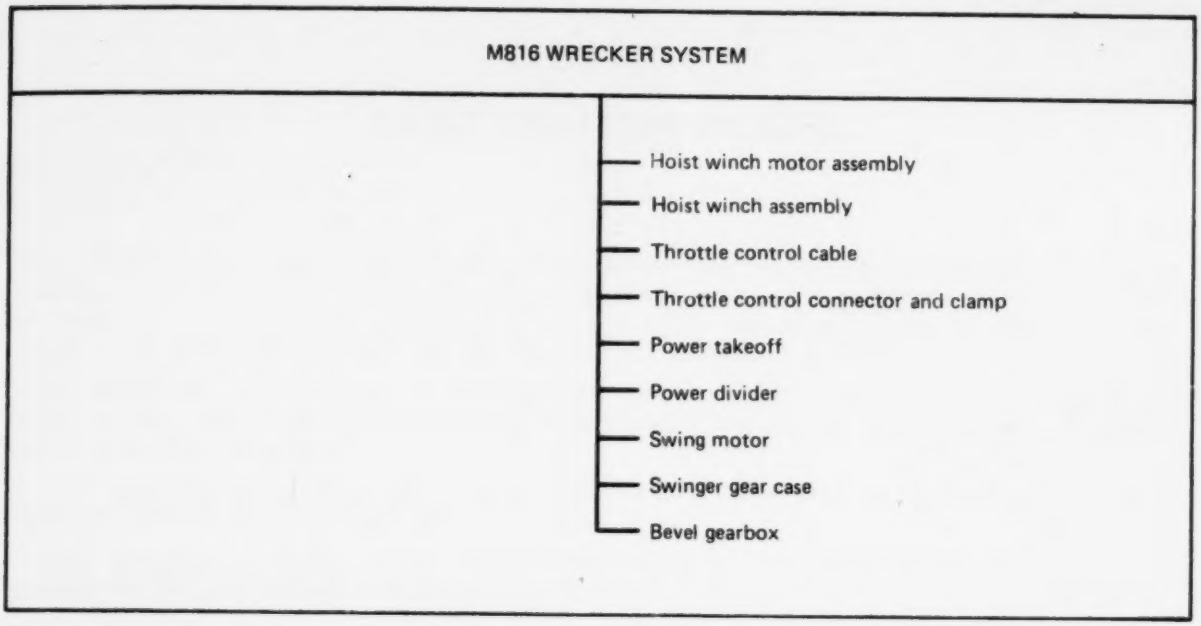
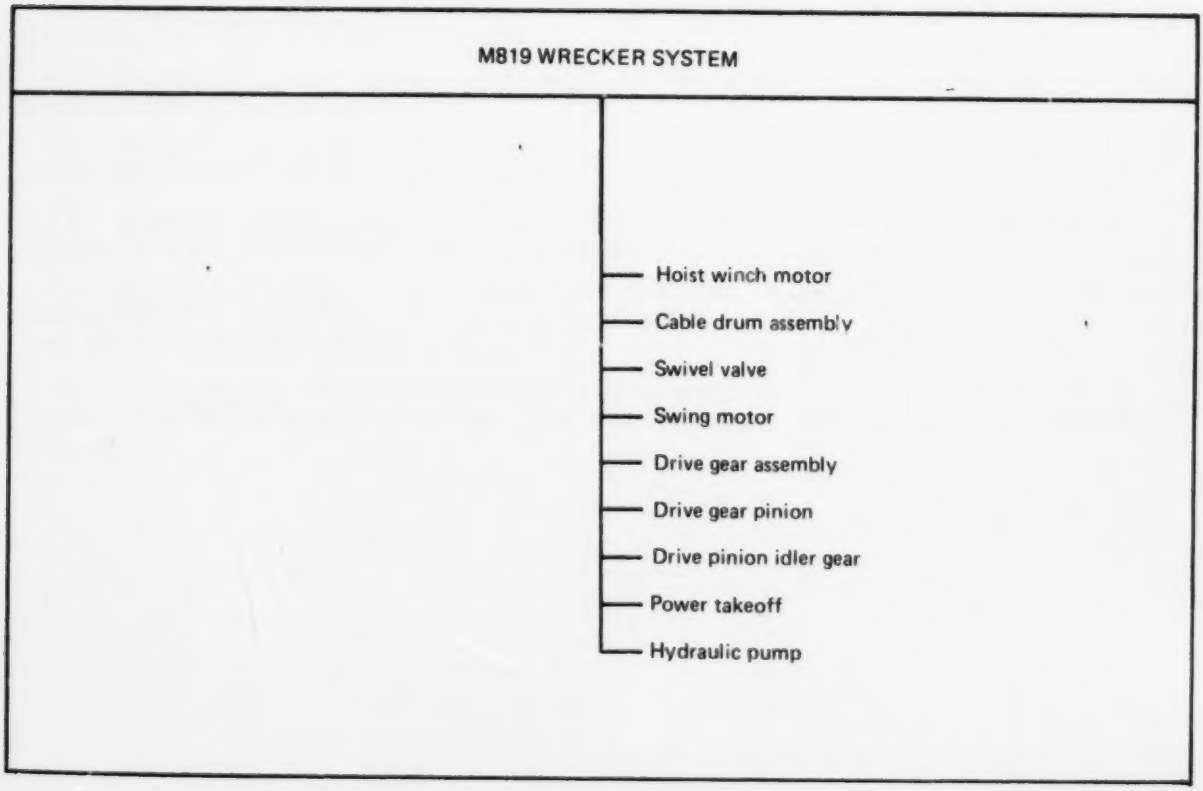


Figure 5-12. Troubleshooting Roadmap, M816 Wrecker System



TA 118137

Figure 5-13. Troubleshooting Roadmap, M819 Wrecker System

CHAPTER 6

FAULT SYMPTOM INDEXES

6-1. GENERAL. This chapter gives troubleshooting fault symptom indexes for every system of the truck for which you have detailed troubleshooting procedures. These indexes are in table form (tables 6-1 through 6-13) which gives you a quick way to check what material you have to use to do your troubleshooting.

6-2. INDEXES. Each index is divided into columns which give you information you need to help you do troubleshooting procedures. The following breakdown tells you what is in each column.

a. Subsystem Column. If the main system is divided into subsystems, the subsystems will be listed in this column.

b. Symptom Column. This column lists the symptoms, or problems for which detailed troubleshooting procedures are given.

c. Summary Column. This column tells you where to find the summary troubleshooting procedures for each symptom.

d. Detailed Column. This column tells you where to find the detailed troubleshooting procedure for each symptom.

e. Persons Column. This column tells you how many people are needed to do the troubleshooting procedure.

f. Special Tools Column. Any tools needed to do the troubleshooting procedure which are not included in your common tool kit are listed in this column.

g. Standard Tools Column. A dot in this column means that tools found in your common tool kit are needed to do the troubleshooting procedure.

h. Materials Column. This column tells you what materials are needed to do the troubleshooting procedure. These materials and how they will be issued will be decided by your maintenance officer.

i. Time Column. This column tells you how much time you will need to do the detailed troubleshooting procedure. The time will be decided by your maintenance officer.

TABLE 6-1. ENGINE SYSTEM

SUBSYSTEM	SYMPTOM	TS PROCEDURE		RESOURCES REQ'D				
		SUMMARY	DETAILED	PERSONS	TEST EQUIPMENT: SPECIAL TOOLS	TEST EQUIPMENT: STANDARD TOOLS	MATERIALS	TIME
———	1. Low or no oil pressure	———	Figure 8-1	1	———			

TABLE 6-2. CLUTCH SYSTEM

SUBSYSTEM	SYMPTOM	TS PROCEDURE		RESOURCES REQ'D				
		SUMMARY	DETAILED	PERSONS	TEST EQUIPMENT: SPECIAL TOOLS	TEST EQUIPMENT: STANDARD TOOLS	MATERIALS	TIME
———	1. Clutch slips	———	Figure 9-1	1	———	•		
———	2. On M816 truck, clutch does not engage when engine clutch control lever is pushed down. Clutch system works normally using clutch pedal in cab	———	Figure 9-2	1	———	•		

TA 118138

TABLE 6-3. FUEL SYSTEM

SUBSYSTEM	SYMPTOM	TS PROCEDURE		RESOURCES REQ'D				
		SUMMARY	DETAILED	PERSONS	TEST EQUIPMENT: SPECIAL TOOLS	TEST EQUIPMENT: STANDARD TOOLS	MATERIALS	TIME
———	1. Engine is hard starting	Figure 11-1	Figure 10-1	2	Pressure gage	•		
———	2. Engine does not start	Figure 11-1	Figure 10-2	1	———	•		
———	3. Engine stalls	Figure 11-1	Figure 10-3	1	———	•		
———	4. Engine runs rough and lacks power	Figure 11-1	Figure 10-4	2	Pressure gage	•		
———	5. Poor fuel mileage	Figure 11-1	Figure 10-5	1	———	•		

TABLE 6-4. FRONT AXLE SYSTEM

SUBSYSTEM	SYMPTOM	TS PROCEDURE		RESOURCES REQ'D				
		SUMMARY	DETAILED	PERSONS	TEST EQUIPMENT: SPECIAL TOOLS	TEST EQUIPMENT: STANDARD TOOLS	MATERIALS	TIME
———	1. Front axle makes noise	Figure 17-1	Figure 16-1	1	Dial indicator	•		
———	2. Shimmy	Figure 17-1	Figure 16-2	1	Dial indicator	•		

TA 118139

TABLE 6-5. REAR AXLE SYSTEM

SUBSYSTEM	SYMPTOM	TS PROCEDURE		RESOURCES REQ'D				
		SUMMARY	DETAILED	PERSONS	TEST EQUIPMENT		MATERIALS	TIME
					SPECIAL TOOLS	STANDARD TOOLS		
———	1. Rear axle makes noise	———	Figure 20-1	1	———	•		
———	2. Too much backlash when driving	———	Figure 20-2	1	———	•		

TA 118140

TABLE 6-6. ELECTRICAL SYSTEM

SUBSYSTEM	SYMPTOM	TS PROCEDURE		RESOURCES REQ'D					
		SUMMARY	DETAILED	PERSONS	TEST EQUIPMENT: MULTIMETER	TEST EQUIPMENT: HYDROMETER	TEST EQUIPMENT: STANDARD TOOLS	MATERIALS	TIME
STARTER	1. Engine cranks but does not start	———	Figure 21-1	1	•		•		
ELECTRIC BRAKE KIT	2. When hydraulic brakes are applied, towed load does not have enough braking action	———	Figure 21-2	1	•		•		
VAN TAILGATE ELECTRICAL EQUIPMENT	3. Van tailgate does not work (M820A2 truck), other van electrical equipment works	———	Figure 21-3	1					
VAN LIGHTS	4. All van lights and equipment do not work	———	Figure 21-4	1	•		•		

TA 118141

TABLE 6-6. ELECTRICAL SYSTEM - Cont

SUBSYSTEM	SYMPTOM	TS PROCEDURE		RESOURCES REQ'D						
		SUMMARY	DETAILED	PERSONS	TEST EQUIPMENT			MATERIALS	TIME
					MULTIMETER	HYDROMETER	STANDARD TOOLS		
ENGINE COOLANT HEATER	5. Engine coolant heater does not start	———	Figure 21-5	1	•		•		
	6. Engine coolant heater overheats and continues burning	———	Figure 21-6	1					
	7. Engine coolant heater does not give off enough heat	———	Figure 21-7	1	•		•		
PERSONNEL FUEL BURNING HEATER	8. Personnel fuel burning heater does not start	———	Figure 21-8	1					
	9. Personnel fuel burning heater overheats and continues burning	———	Figure 21-9	1	•		•		
	10. Personnel fuel burning heater does not give off enough heat	———	Figure 21-10	1					

TA 118142

TABLE 6-7. BRAKE SYSTEM

SUBSYSTEM	SYMPTOM	TS PROCEDURE		RESOURCES REQ'D				
		SUMMARY	DETAILED	PERSONS	TEST EQUIPMENT: SPECIAL TOOLS	TEST EQUIPMENT: STANDARD TOOLS	MATERIALS	TIME
———	1. Buzzer does not shut off and air pressure gage reads below 60 PSI	———	Figure 23-1	1	———	•		

TABLE 6-8. STEERING SYSTEM

SUBSYSTEM	SYMPTOM	TS PROCEDURE		RESOURCES REQ'D				
		SUMMARY	DETAILED	PERSONS	TEST EQUIPMENT: SPECIAL TOOLS	TEST EQUIPMENT: STANDARD TOOLS	MATERIALS	TIME
———	1. Hard steering	Figure 26-1	Figure 25-1	2	Power steering oil pressure test set	•		
———	2. Shimmy	Figure 26-1	Figure 25-2	1	———	•		

TA 118143

TABLE 6-9. VAN TAILGATE SYSTEM

SUBSYSTEM	SYMPTOM	TS PROCEDURE		RESOURCES REQ'D				
		SUMMARY	DETAILED	PERSONS	TEST EQUIPMENT		MATERIALS	TIME
					SPECIAL TOOLS	STANDARD TOOLS		
_____	1. Tailgate does not go up or down	Figure 29-1	Figure 28-1	2	Pressure gage	•		
_____	2. Tailgate works slowly	Figure 29-1	Figure 28-2	2	Pressure gage	•		
_____	3. Platform does not open or close	Figure 29-1	Figure 28-3	2	Pressure gage	•		
_____	4. Platform does not open or close all the way	Figure 29-1	Figure 28-4	1	_____			

TA 118144

TABLE 6-10. MIDSHIP WINCH SYSTEM

SUBSYSTEM	SYMPTOM	TS PROCEDURE		RESOURCES REQ'D				
		SUMMARY	DETAILED	PERSONS	TEST EQUIPMENT: SPECIAL TOOLS	TEST EQUIPMENT: STANDARD TOOLS	MATERIALS	TIME
———	1. Winch does not pull load	———	Figure 33-1	1	———	•		

TABLE 6-11. FRONT WINCH SYSTEM

SUBSYSTEM	SYMPTOM	TS PROCEDURE		RESOURCES REQ'D				
		SUMMARY	DETAILED	PERSONS	TEST EQUIPMENT: SPECIAL TOOLS	TEST EQUIPMENT: STANDARD TOOLS	MATERIALS	TIME
———	1. Winch does not pull load	———	Figure 34-1	1	———	•		

TA 118145

TABLE 6-12. M816 WRECKER

SUBSYSTEM	SYMPTOM	TS PROCEDURE		RESOURCES REQ'D				
		SUMMARY	DETAILED	PERSONS	TEST EQUIPMENT: SPECIAL TOOLS	TEST EQUIPMENT: STANDARD TOOLS	MATERIALS	TIME
———	1. Hoist winch does not pull load	Figure 36-1	Figure 35-1	1	———	•		
———	2. Hoist winch pulls load slowly	Figure 36-1	Figure 35-2	1	———	•		
———	3. Jerky operation as hoist winch pulls load	Figure 36-1	Figure 35-3	1	———	•		
———	4. Throttle control lever does not raise engine speed	Figure 36-1	Figure 35-4	1	———	•		
———	5. Power takeoff to power divider propeller shaft does not turn	Figure 36-1	Figure 35-5	1	———	•		
———	6. Crane does not swing	Figure 36-1	Figure 35-6	1	———	•		
———	7. Crane swings slowly	Figure 36-1	Figure 35-7	1	———	•		
———	8. Jerky operation as crane swings	Figure 36-1	Figure 35-8	1	———	•		
———	9. Power divider to bevel gearbox propeller shaft does not turn	Figure 36-1	Figure 35-9	1	———	•		

TA 116146

TABLE 6-13. M819 WRECKER SYSTEM

SUBSYSTEM	SYMPTOM	TS PROCEDURE		RESOURCES REQ'D				
		SUMMARY	DETAILED	PERSONS	TEST EQUIPMENT: SPECIAL TOOLS	TEST EQUIPMENT: STANDARD TOOLS	MATERIALS	TIME
———	1. Hoist winch does not pull load	Figure 39-1	Figure 38-1	1	———	•		
———	2. Hoist winch pulls load slowly	Figure 39-1	Figure 38-2	1	———	•		
———	3. Jerky operation as hoist winch pulls load	Figure 39-1	Figure 38-3	1	———	•		
———	4. Crane does not swing	Figure 39-1	Figure 38-4	2	Pressure gage	•		
———	5. Crane swings slowly	Figure 39-1	Figure 38-5	2	Pressure gage	•		
———	6. Jerky operation as crane swings	Figure 39-1	Figure 38-6	2	Pressure gage	•		
———	7. Power takeoff to hydraulic pump propeller shaft does not turn	Figure 39-1	Figure 38-7	1	———	•		

TA 118147

CHAPTER 7

SAMPLE TROUBLESHOOTING PROCEDURE

7-1. GENERAL. This chapter gives a sample troubleshooting procedure. The purpose of the sample procedure is to help you see how detailed troubleshooting procedures, test equipment procedures, and summary troubleshooting procedures are used to find faults in a system.

7-2. SAMPLE DETAILED PROCEDURE. (See figure 7-1.) The sample detailed procedure given is the fuel system troubleshooting procedure for the symptom, STARTER MOTOR WILL NOT CRANK ENGINE. This symptom is one you will have when you try to start your truck and certain parts on the truck are not working correctly. In each numbered box, instructions are given which tell you what to do, and how to do it. A large dot is placed next to the "what-to-do" instructions, and small dots next to the "how-to-do-it" instructions.

a. Box number 1 gives general instructions on getting the truck ready before you start to troubleshoot.

b. Box number 2 gives fault isolation test instructions. In this case you are told to check starting system circuit for loose, burned, or broken leads and connections. These tests or checks are often referred to in detailed troubleshooting procedures to help you find the problem and fix it. After you do the tests or checks you read the question at the bottom of box number 2. If the starter system is not okay, the answer to the question is (NO), so you go to the next box.

c. Box number 3 gives you a corrective action. In this case the fault is burned or broken leads or connectors. The corrective action is what you do to fix the fault, which is to replace any burned or broken leads or connectors. If the engine still doesn't start after you do this, it could mean that there are other faults in the system. When this happens, go back to the beginning of the procedure and do each step again until you find the other faults.

d. Sometimes the corrective actions given for a fault will tell you what to do to fix the fault, but will not give you detailed instructions on how to fix it. Instead, you will be told to refer to another volume in this manual for these instructions. Box number 4 is an example of this.

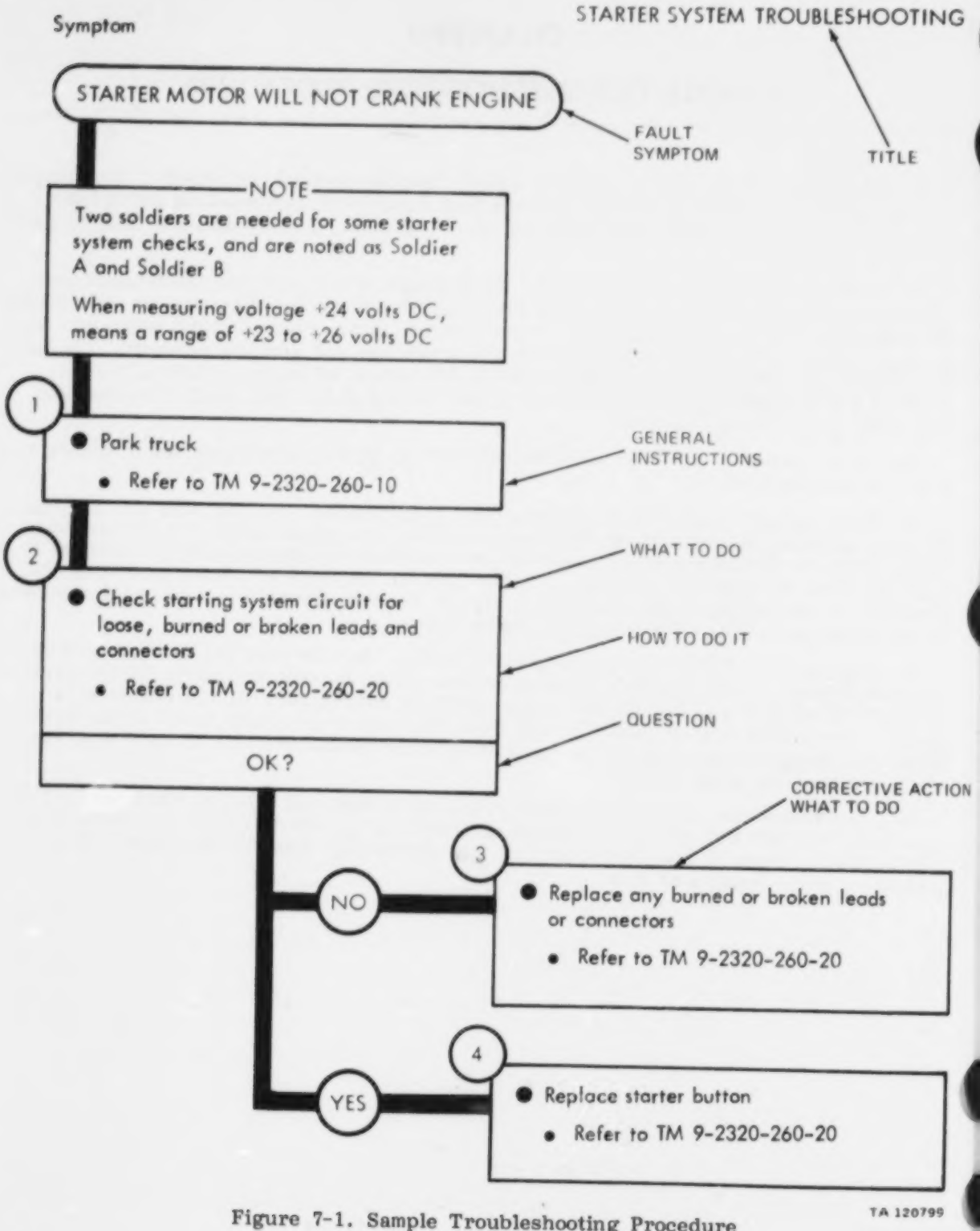


Figure 7-1. Sample Troubleshooting Procedure

CHAPTER 8

ENGINE SYSTEM TROUBLESHOOTING

8-1. EQUIPMENT ITEMS COVERED. This chapter gives equipment troubleshooting procedures for the Engine System, for which there are authorized corrective maintenance tasks at direct support and general support level of maintenance.

8-2. EQUIPMENT ITEMS NOT COVERED. All equipment items for which corrective maintenance is authorized at direct support and general support level of maintenance are covered in this chapter.

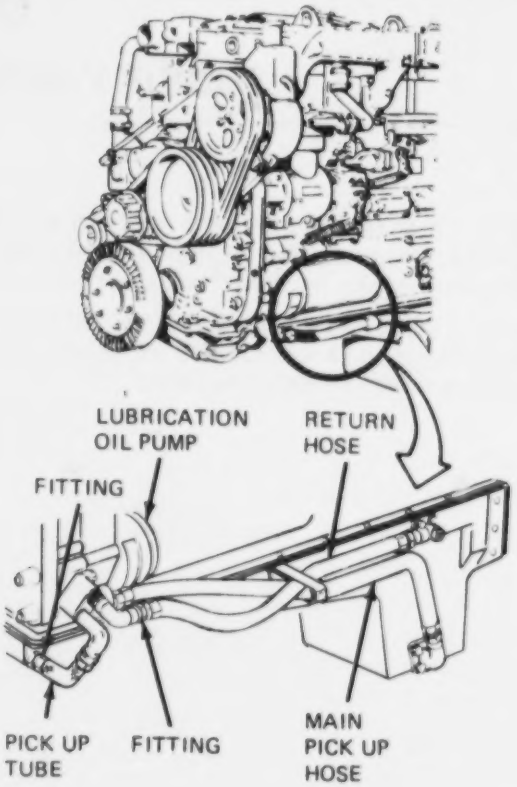
Symptom

1 LOW OR NO OIL PRESSURE

1
- Park truck
  - Refer to TM 9-2320-260-10

2
- Check lubricating oil pump pickup tube, return hose and main oil pickup hose
  - Look for loose fittings
  - Look for leaking hoses
  - Look for broken pickup tube

Is pickup tube return hose and main pickup hose OK?



NO

3
- Tighten loose fittings
  - Using 15/16-inch wrench tighten loose fittings
- Replace broken pickup tube or leaking hoses
  - Refer to TM 9-2320-260-20

YES

4
- Replace oil pump
  - Refer to Vol 2, chapter 2, para 2-9

TA 118157

Figure 8-1

CHAPTER 9

CLUTCH SYSTEM TROUBLESHOOTING

9-1. EQUIPMENT ITEMS COVERED. This chapter gives equipment troubleshooting procedures for the Clutch System, for which there are authorized corrective maintenance tasks at direct support and general support level of maintenance.

9-2. EQUIPMENT ITEMS NOT COVERED. All equipment items for which corrective maintenance is authorized at direct support and general support level of maintenance are covered in this chapter.

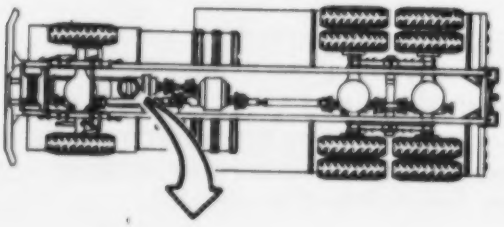
CLUTCH SYSTEM TROUBLESHOOTING

Symptom 1

CLUTCH SLIPS

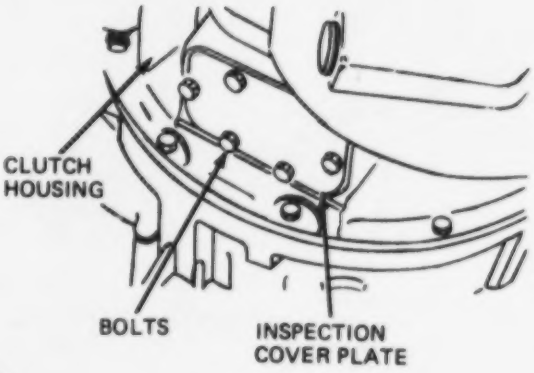
1

- Make truck ready for work on clutch
  - Park truck. Refer to TM 9-2320-260-10
  - Chock wheels



2

- Check front transmission oil seal
  - Using 1/2-inch wrench unscrew and take out clutch housing inspection cover plate bolts. Take off plate
  - Look for signs of oil on inside of cover plate
  - Feel inside clutch housing for an oily surface



Is clutch housing dry?

NO

3

- Replace front transmission seal
  - Refer to Vol 2, chapter 8, para 8-4

  Note: If transmission seal was leaking oil damage was done to the clutch
- Replace clutch
  - Refer to Vol 2, chapter 2, para 2-93

YES

4

- Replace clutch
  - Refer to Vol 2, chapter 2, para 2-93

TA 118158

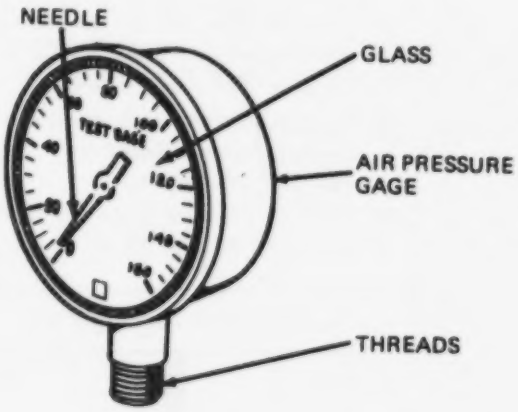
Figure 9-1

Symptom

2 ON M816 TRUCK, CLUTCH DOES NOT ENGAGE WHEN ENGINE CLUTCH CONTROL LEVER IS PUSHED DOWN. CLUTCH SYSTEM WORKS NORMALLY USING CLUTCH PEDAL IN CAB

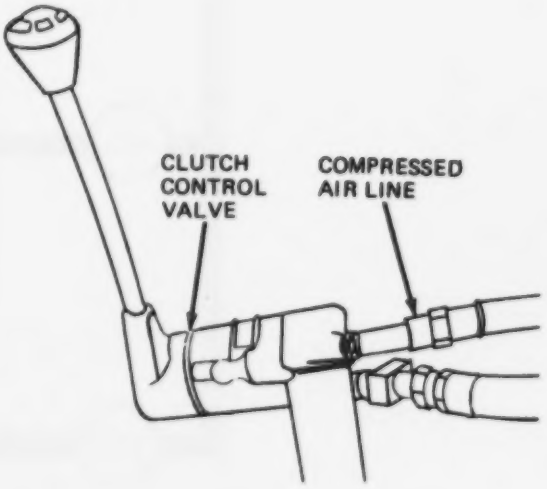
1

- Park truck
  - Refer to TM 9-2320-260-10
- Check air pressure gage before using
  - See that glass and needle are not broken
  - See that threads are not damaged



2

- Check rotochamber pressure
  - Open air cylinder reservoir drain valve
  - Go to crane control assembly
  - Using 7/8-inch wrench unscrew and take off compressed air line from control valve to rotochamber
  - Screw T-fitting into clutch control valve and tighten using 3/4-inch wrench
  - Screw compressed air line into T-fitting and tighten using 7/8-inch wrench



GO

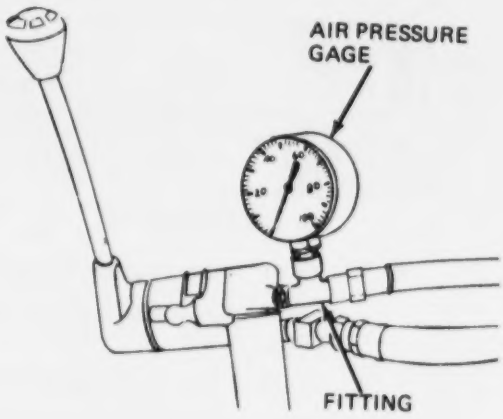
TA 118159

Figure 9-2 (Sheet 1 of 2)

GO

- Screw air pressure gage into T-fitting and tighten using 9/16-inch wrench
- Close air cylinder reservoir drain valve
- Start engine and let air pressure build up to operating pressure. Refer to TM 9-2320-260-10
- Engage clutch using engine clutch control lever. Refer to TM 9-2320-260-10
- Look at pressure gage for reading bwtween 60 and 85 psi

Is pressure reading OK?



NO

3

- Replace crane control assembly
  - Refer to Vol 2, chapter 17, para 17-27

YES

4

- Replace rotochamber
  - Refer to Vol 2, chapter 17, para 17-65

TA 118160

Figure 9-2 (Sheet 2 of 2)

CHAPTER 10

FUEL SYSTEM TROUBLESHOOTING

10-1. EQUIPMENT ITEMS COVERED. This chapter gives equipment troubleshooting procedures for the Fuel System, for which there are authorized corrective maintenance tasks at direct support and general support level of maintenance.

10-2. EQUIPMENT ITEMS NOT COVERED. All equipment items for which corrective maintenance is authorized at direct support and general support level of maintenance are covered in this chapter.

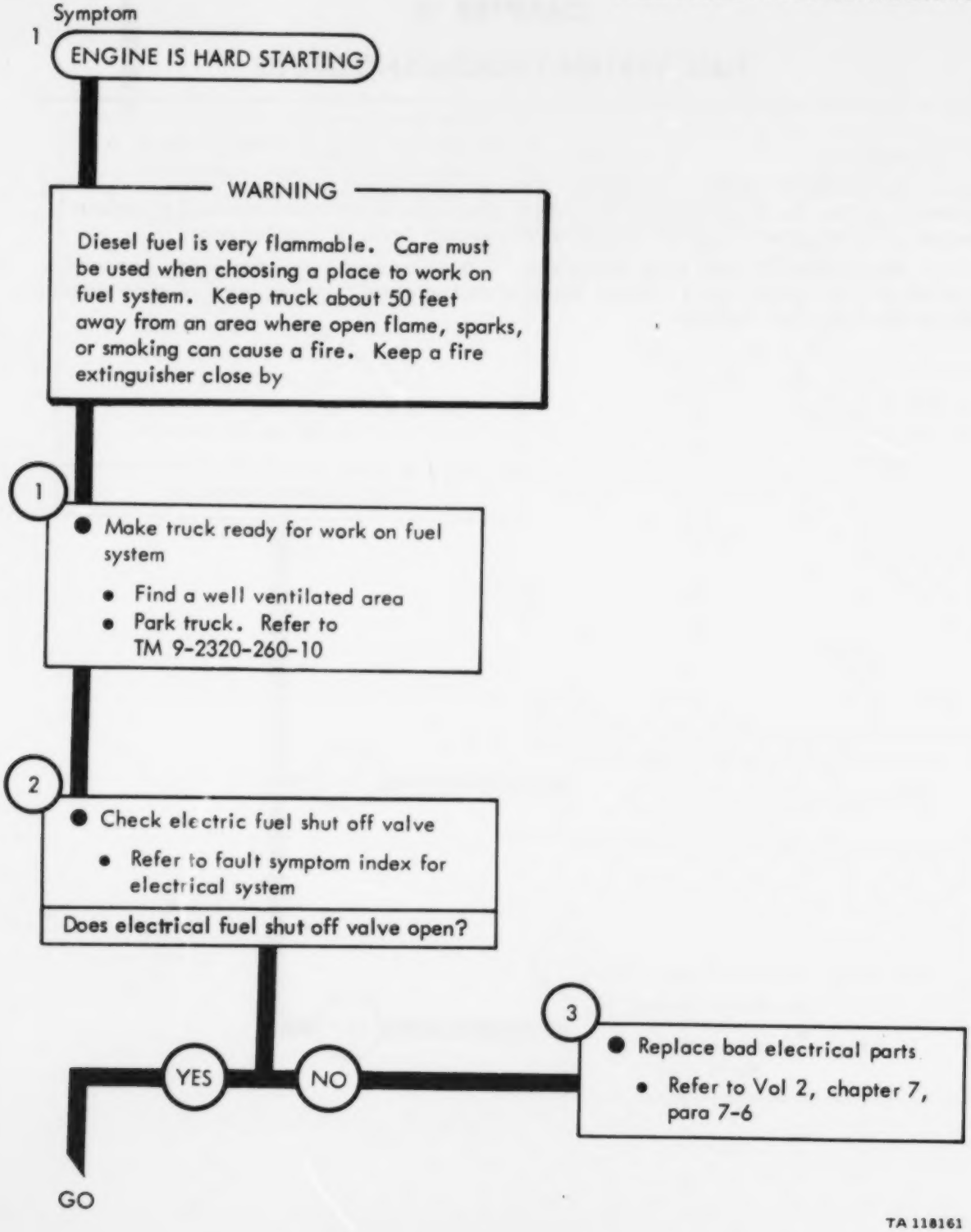

Symptom
1
ENGINE IS HARD STARTING
WARNING
Diesel fuel is very flammable. Care must be used when choosing a place to work on fuel system. Keep truck about 50 feet away from an area where open flame, sparks, or smoking can cause a fire. Keep a fire extinguisher close by
1
Make truck ready for work on fuel system
Find a well ventilated area
Park truck. Refer to TM 9-2320-260-10
2
Check electric fuel shut off valve
Refer to fault symptom index for electrical system
Does electrical fuel shut off valve open?
YES
NO
3
Replace bad electrical parts
Refer to Vol 2, chapter 7, para 7-6
GO
TA 118161

Figure 10-1 (Sheet 1 of 2)

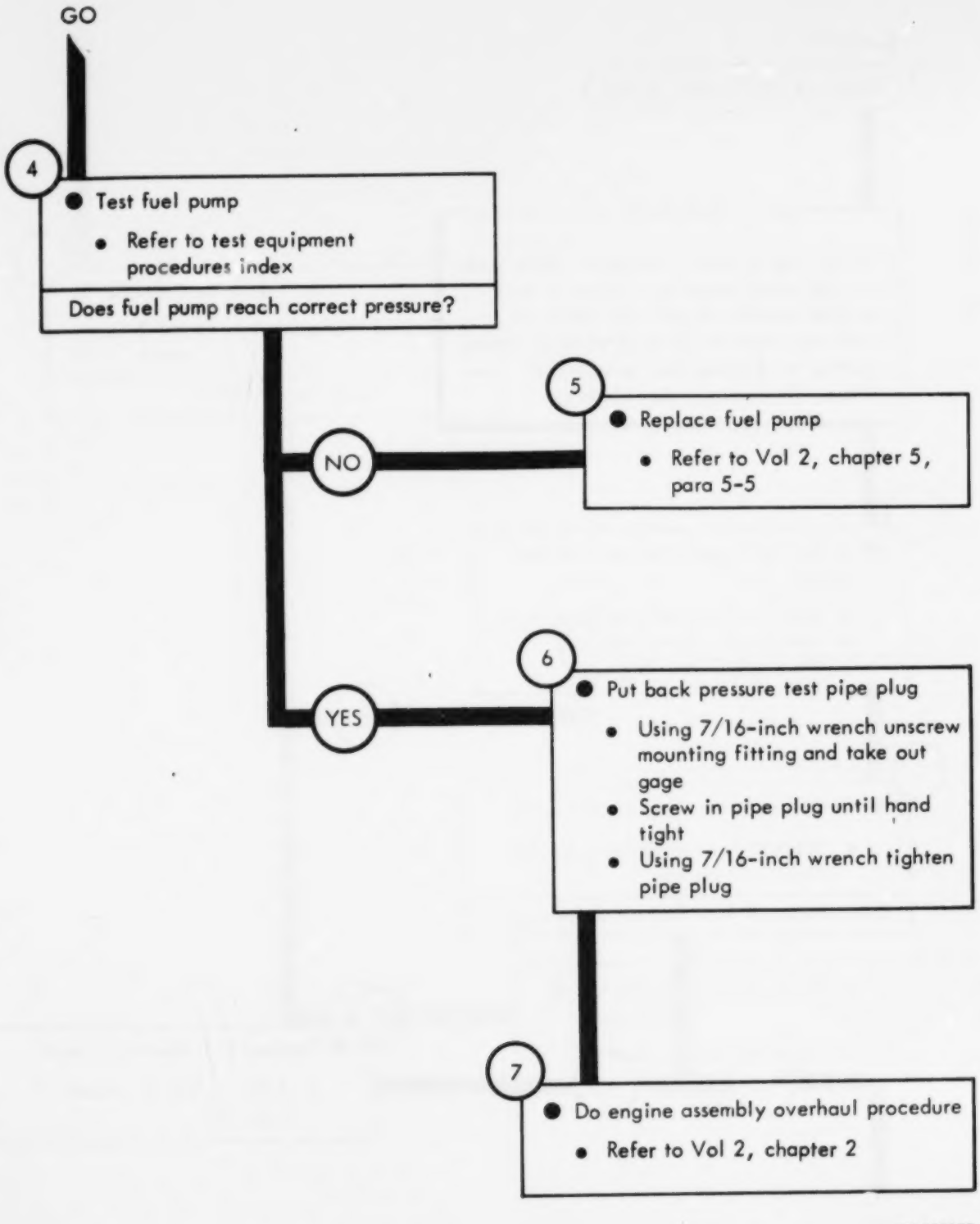


Figure 10-1 (Sheet 2 of 2)

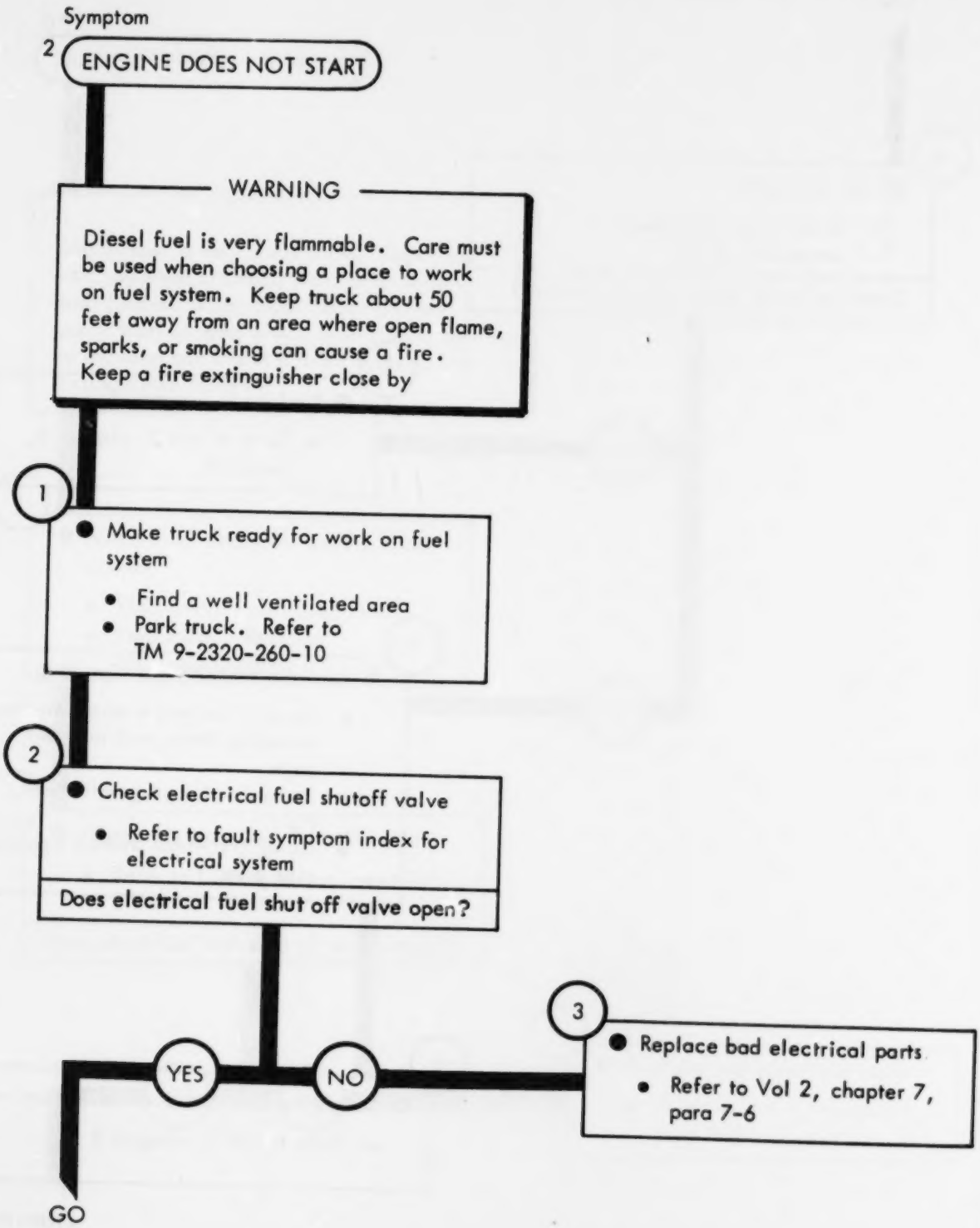

Symptom
2
ENGINE DOES NOT START
WARNING
Diesel fuel is very flammable. Care must be used when choosing a place to work on fuel system. Keep truck about 50 feet away from an area where open flame, sparks, or smoking can cause a fire. Keep a fire extinguisher close by
1
Make truck ready for work on fuel system
Find a well ventilated area
Park truck. Refer to TM 9-2320-260-10
2
Check electrical fuel shutoff valve
Refer to fault symptom index for electrical system
Does electrical fuel shut off valve open?
YES
NO
3
Replace bad electrical parts
Refer to Vol 2, chapter 7, para 7-6
GO
TA 118163

Figure 10-2 (Sheet 1 of 2)

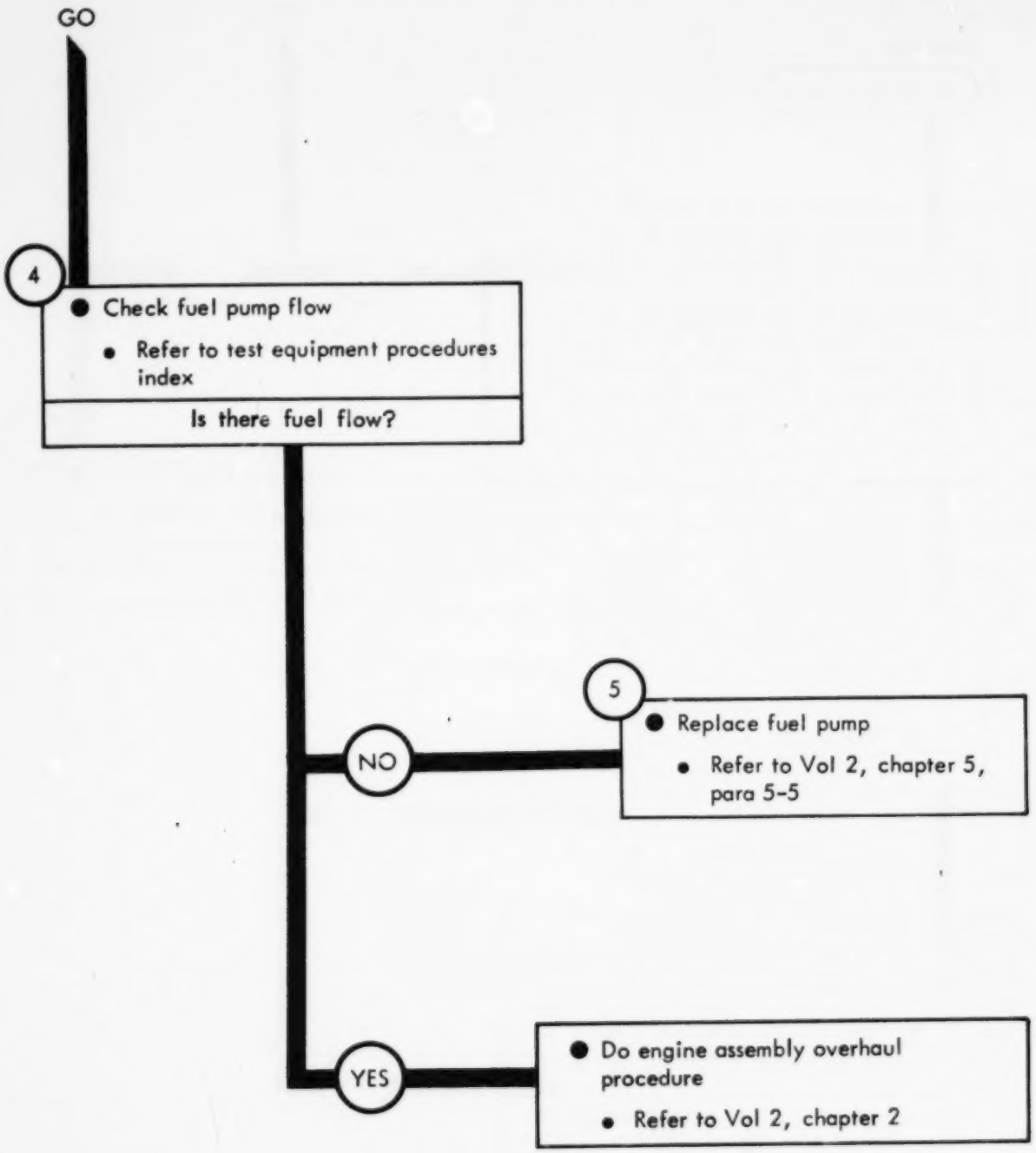
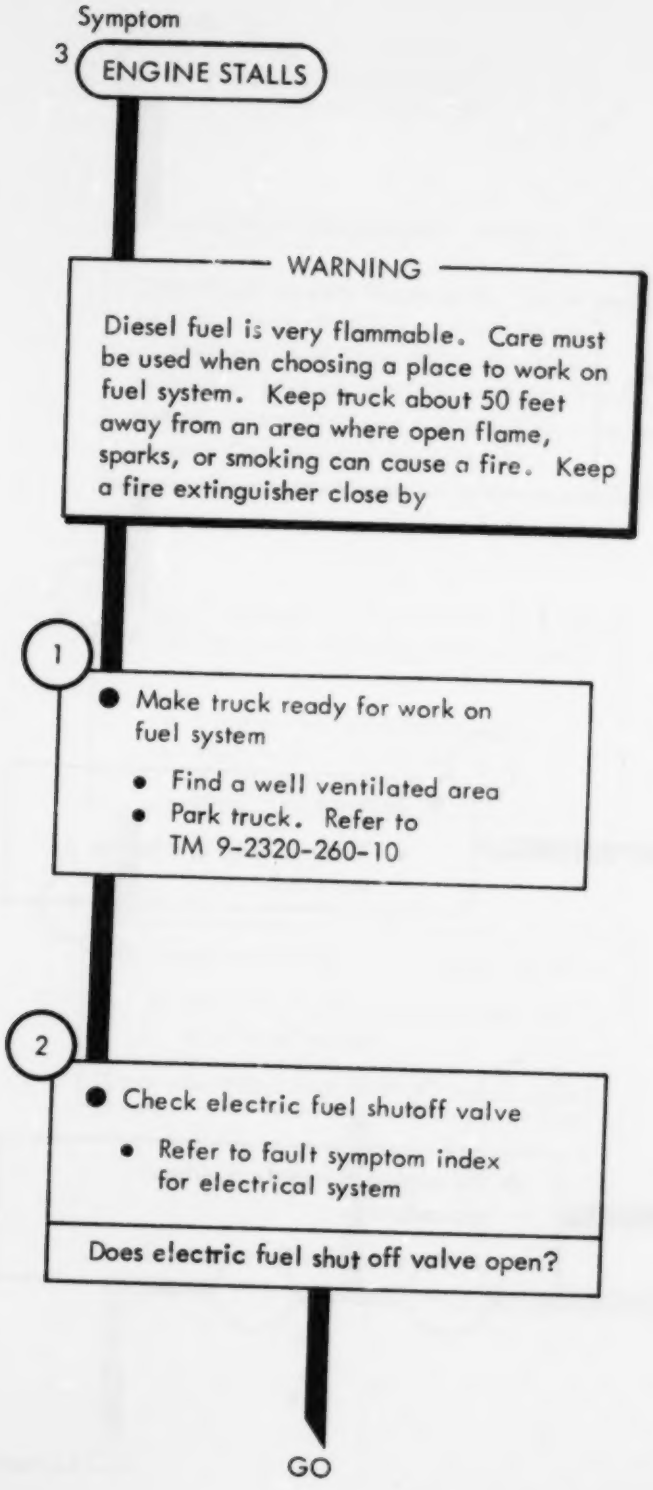
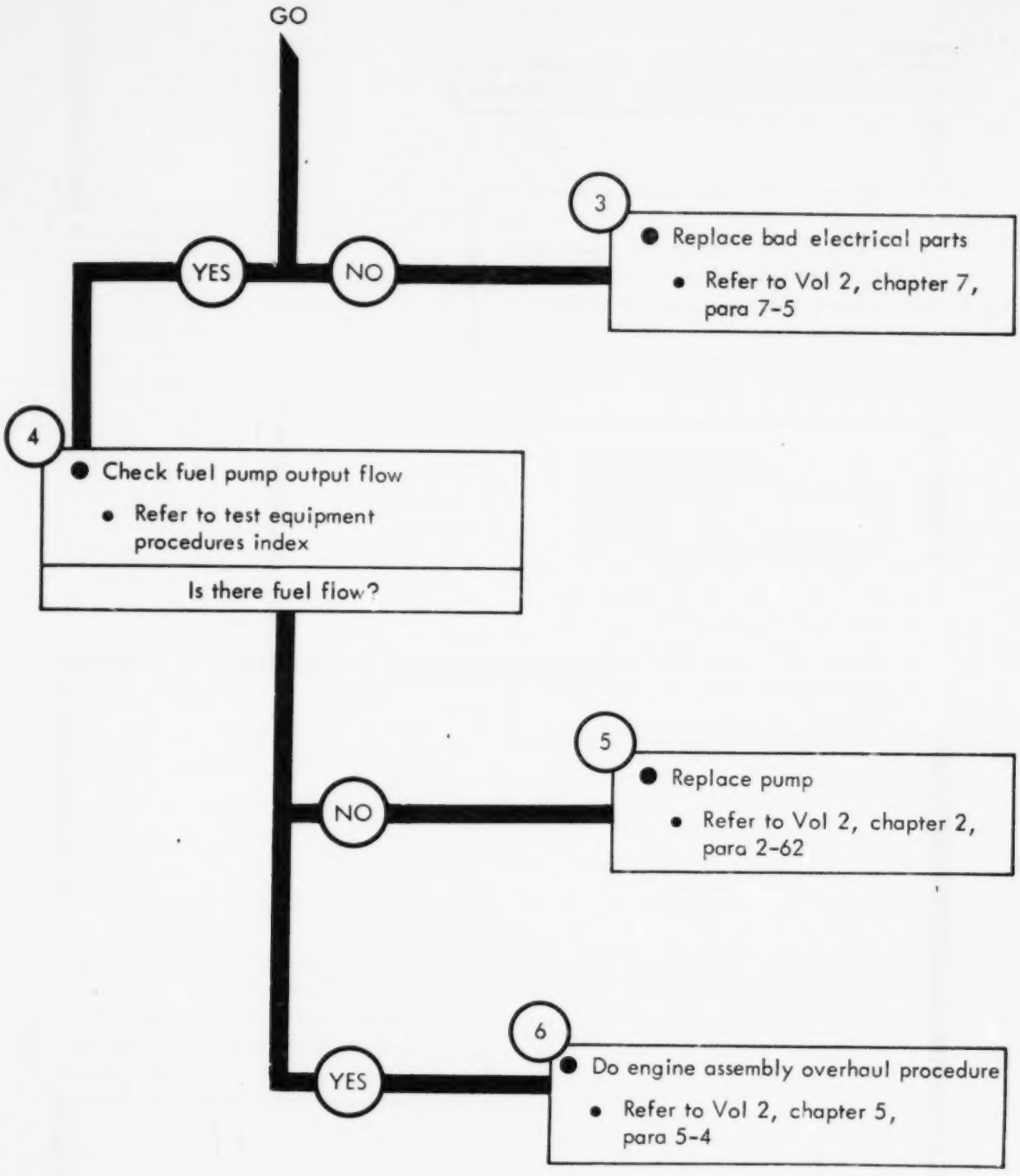


Figure 10-2 (Sheet 2 of 2)


Symptom
3
ENGINE STALLS
WARNING
Diesel fuel is very flammable. Care must be used when choosing a place to work on fuel system. Keep truck about 50 feet away from an area where open flame, sparks, or smoking can cause a fire. Keep a fire extinguisher close by
1
Make truck ready for work on fuel system
Find a well ventilated area
Park truck. Refer to TM 9-2320-260-10
2
Check electric fuel shutoff valve
Refer to fault symptom index for electrical system
Does electric fuel shut off valve open?
GO

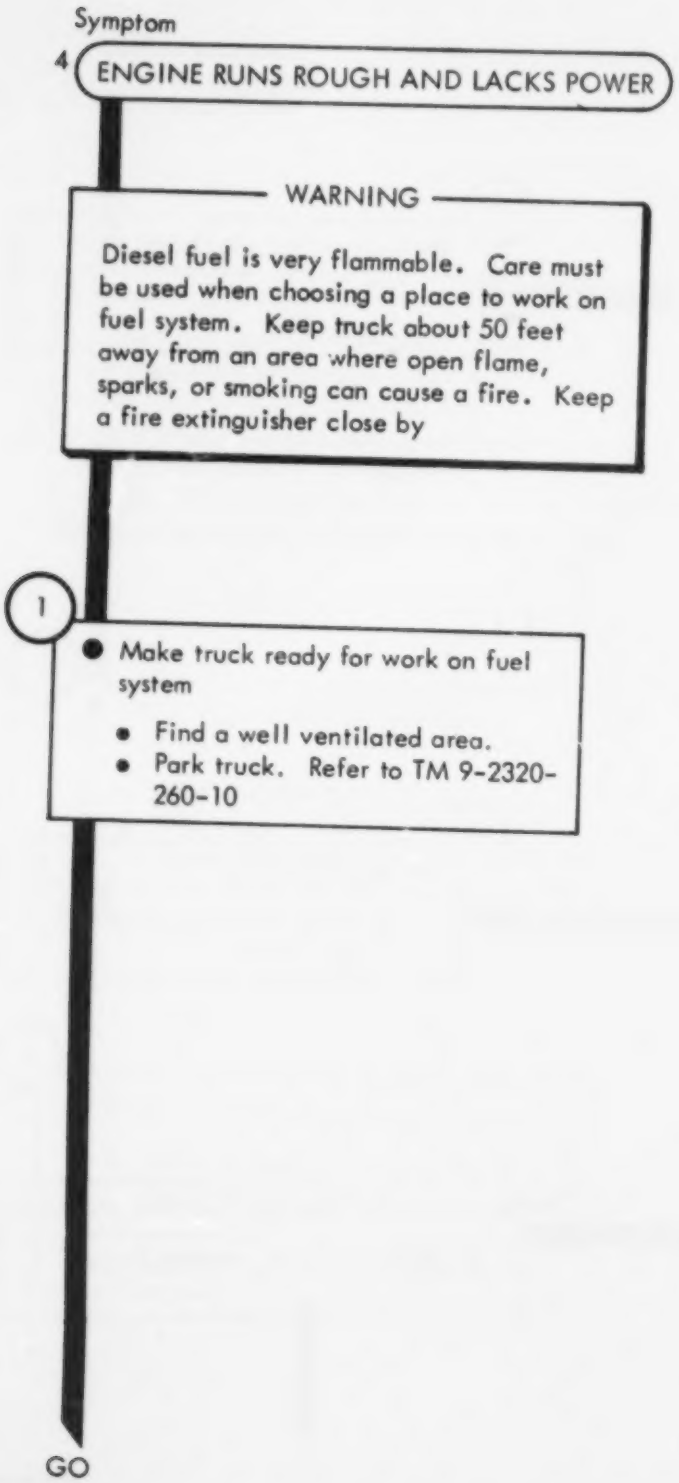
TA 118165

Figure 10-3 (Sheet 1 of 2)



TA 118166

Figure 10-3 (Sheet 2 of 2)


Symptom
4
ENGINE RUNS ROUGH AND LACKS POWER
WARNING
Diesel fuel is very flammable. Care must be used when choosing a place to work on fuel system. Keep truck about 50 feet away from an area where open flame, sparks, or smoking can cause a fire. Keep a fire extinguisher close by
1
Make truck ready for work on fuel system
Find a well ventilated area.
Park truck. Refer to TM 9-2320-260-10
GO

TA 118167

Figure 10-4 (Sheet 1 of 6)

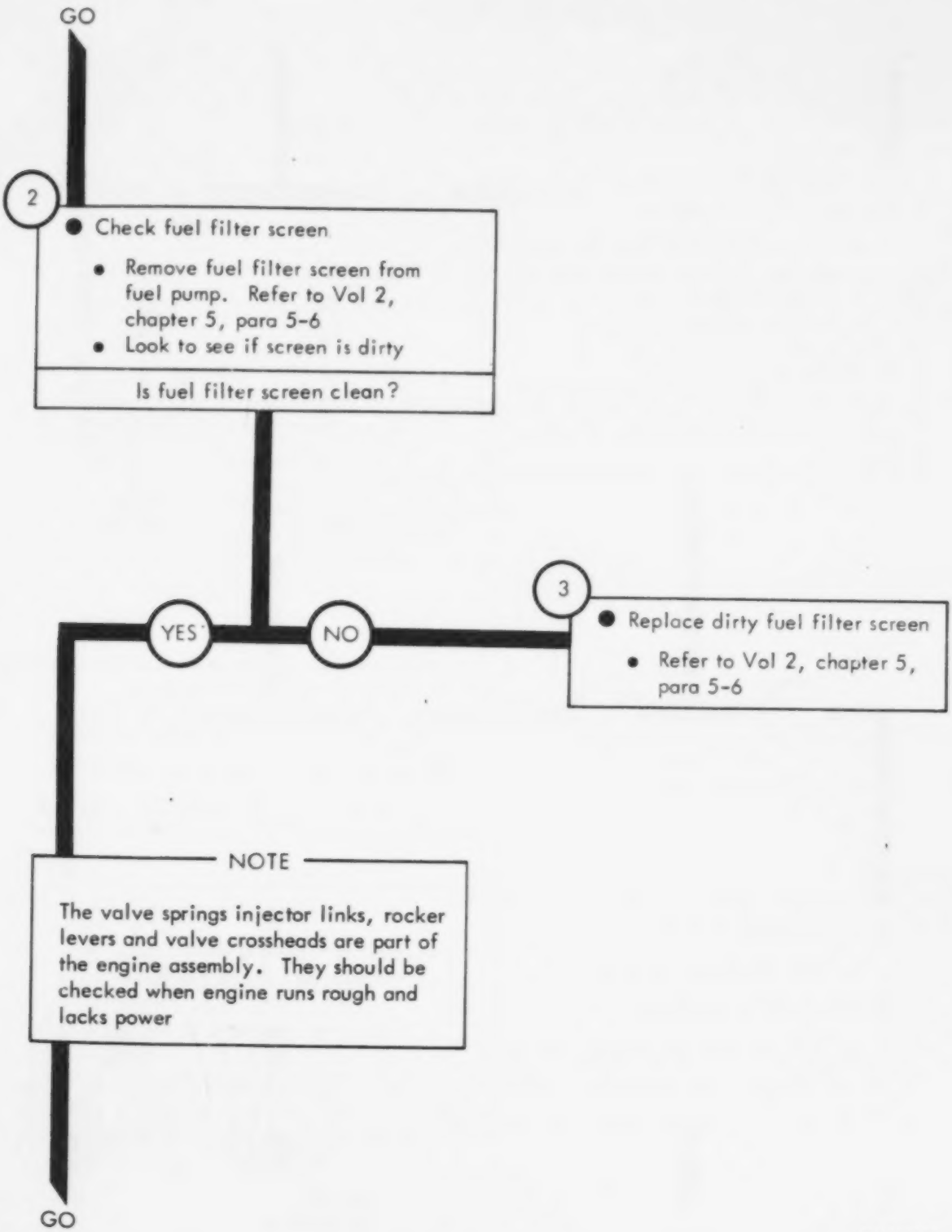

GO
2
Check fuel filter screen
Remove fuel filter screen from fuel pump. Refer to Vol 2, chapter 5, para 5-6
Look to see if screen is dirty
Is fuel filter screen clean?
YES
NO
3
Replace dirty fuel filter screen
Refer to Vol 2, chapter 5, para 5-6
NOTE
The valve springs injector links, rocker levers and valve crossheads are part of the engine assembly. They should be checked when engine runs rough and lacks power
GO
TA 118168

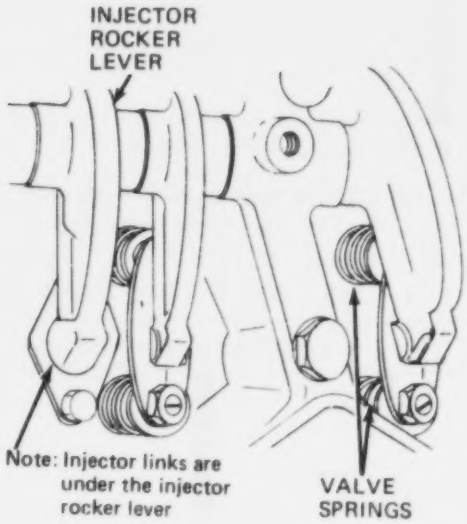
Figure 10-4 (Sheet 2 of 6)

GO

4

- Check all valve springs
  - Remove all rocker lever housing covers. Refer to Vol 2, chapter 2, para 2-11
  - Look for a broken spring
- Check all injector links
  - Look for a bent or broken link

Are all injector links and valve springs OK?



YES

NO

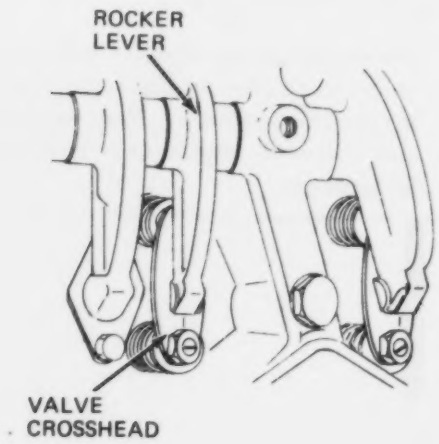
5

- Replace broken valve springs
  - Refer to Vol 2, chapter 2, para 2-32
- Replace bent or broken injector links
  - Refer to Vol 2, chapter 5, para 5-3

6

- Check rocker levers
  - Look for broken levers
- Check valve crossheads
  - Look for bent, or broken crossheads

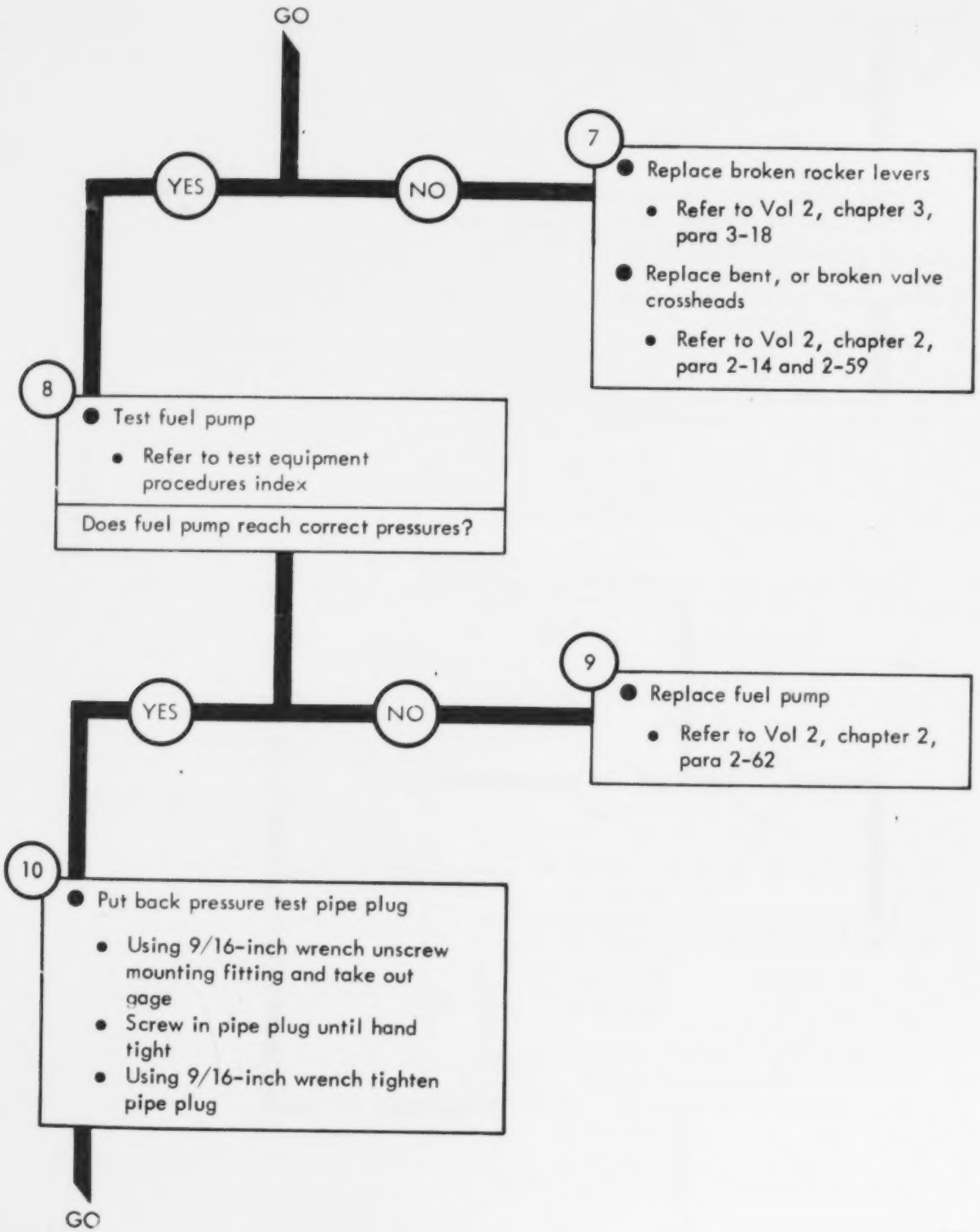
Are all rocker levers and valve crossheads OK?



GO

Figure 10-4 (Sheet 3 of 6)

TA 118169


GO
YES
NO
7
Replace broken rocker levers
Refer to Vol 2, chapter 3, para 3-18
Replace bent, or broken valve crossheads
Refer to Vol 2, chapter 2, para 2-14 and 2-59
8
Test fuel pump
Refer to test equipment procedures index
Does fuel pump reach correct pressures?
YES
NO
9
Replace fuel pump
Refer to Vol 2, chapter 2, para 2-62
10
Put back pressure test pipe plug
Using 9/16-inch wrench unscrew mounting fitting and take out gage
Screw in pipe plug until hand tight
Using 9/16-inch wrench tighten pipe plug
GO

TA 118170

Figure 10-4 (Sheet 4 of 6)

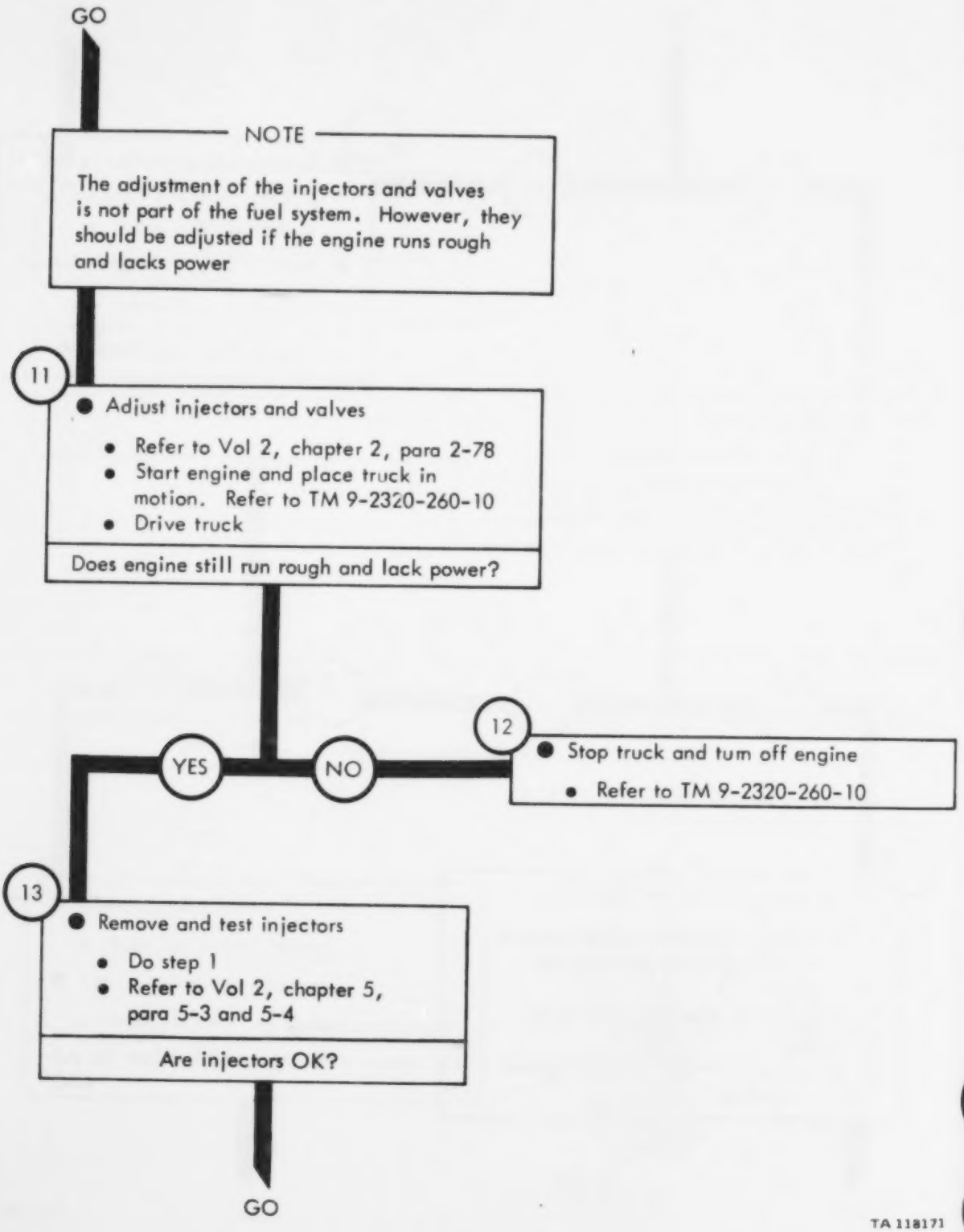

GO
NOTE
The adjustment of the injectors and valves is not part of the fuel system. However, they should be adjusted if the engine runs rough and lacks power
11
Adjust injectors and valves
Refer to Vol 2, chapter 2, para 2-78
Start engine and place truck in motion. Refer to TM 9-2320-260-10
Drive truck
Does engine still run rough and lack power?
YES
NO
12
Stop truck and turn off engine
Refer to TM 9-2320-260-10
13
Remove and test injectors
Do step 1
Refer to Vol 2, chapter 5, para 5-3 and 5-4
Are injectors OK?
GO
TA 118171

Figure 10-4 (Sheet 5 of 6)

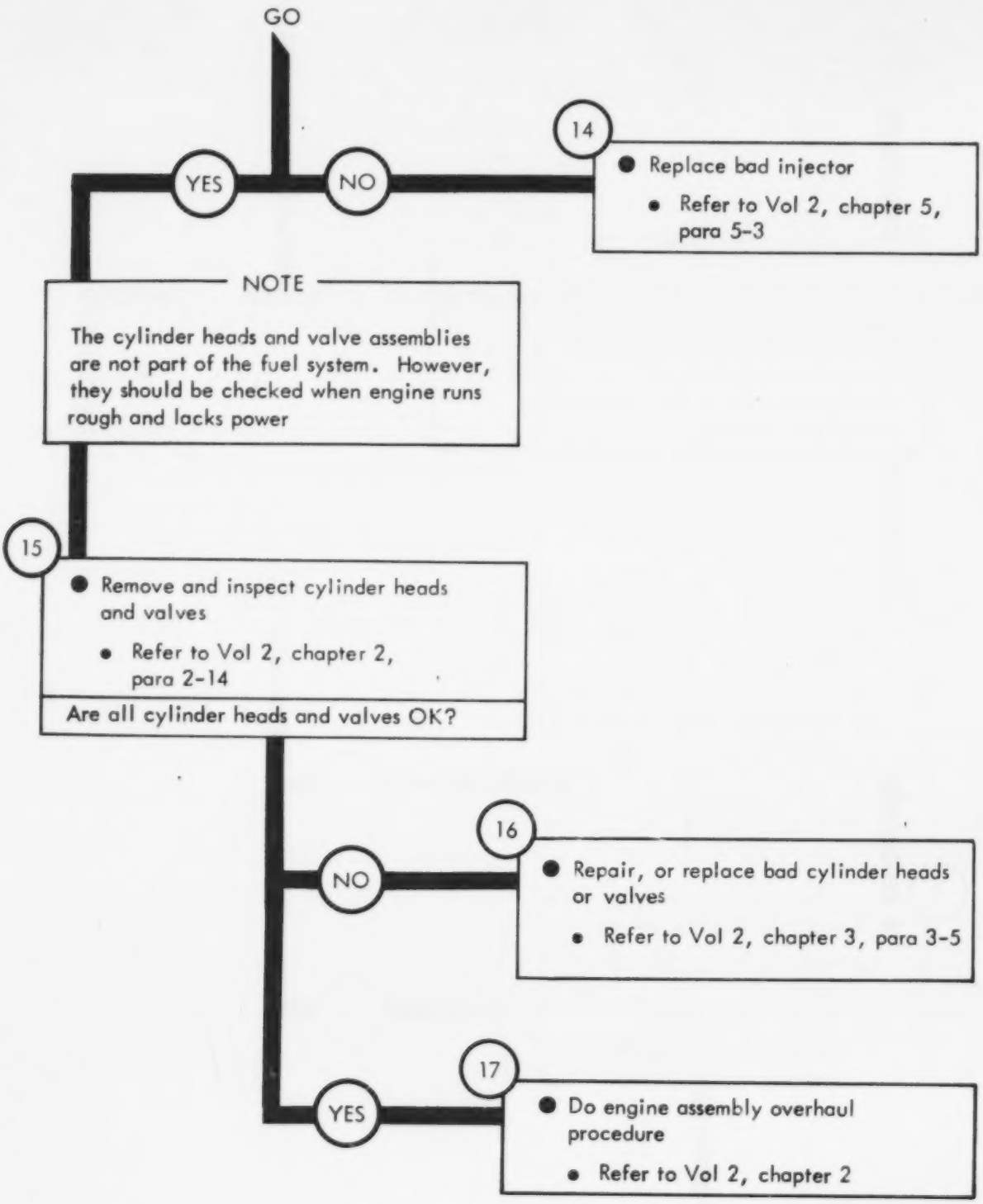
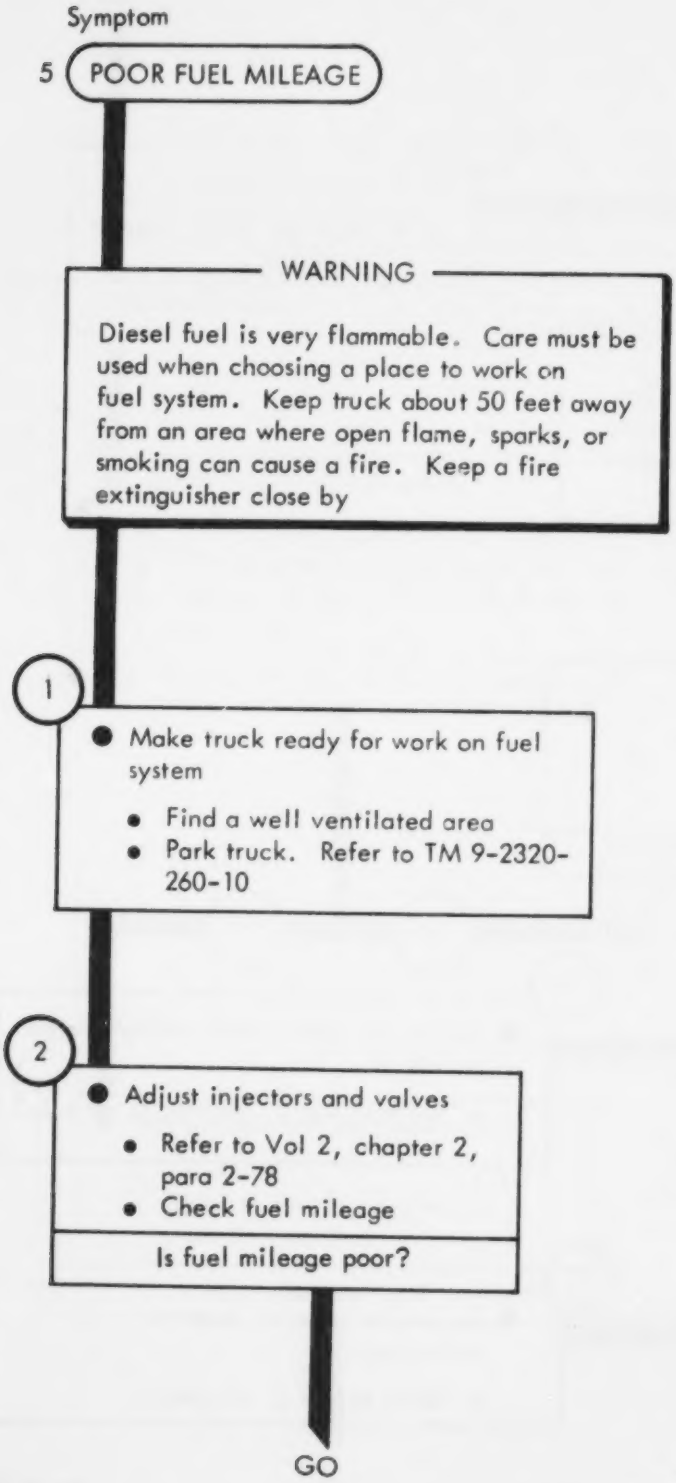

GO
YES
NO
14
Replace bad injector
Refer to Vol 2, chapter 5, para 5-3
NOTE
The cylinder heads and valve assemblies are not part of the fuel system. However, they should be checked when engine runs rough and lacks power
15
Remove and inspect cylinder heads and valves
Refer to Vol 2, chapter 2, para 2-14
Are all cylinder heads and valves OK?
NO
16
Repair, or replace bad cylinder heads or valves
Refer to Vol 2, chapter 3, para 3-5
YES
17
Do engine assembly overhaul procedure
Refer to Vol 2, chapter 2
TA 118172

Figure 10-4 (Sheet 6 of 6)


Symptom
5
POOR FUEL MILEAGE
WARNING
Diesel fuel is very flammable. Care must be used when choosing a place to work on fuel system. Keep truck about 50 feet away from an area where open flame, sparks, or smoking can cause a fire. Keep a fire extinguisher close by
1
Make truck ready for work on fuel system
Find a well ventilated area
Park truck. Refer to TM 9-2320-260-10
2
Adjust injectors and valves
Refer to Vol 2, chapter 2, para 2-78
Check fuel mileage
Is fuel mileage poor?
GO

TA 118173

Figure 10-5 (Sheet 1 of 2)

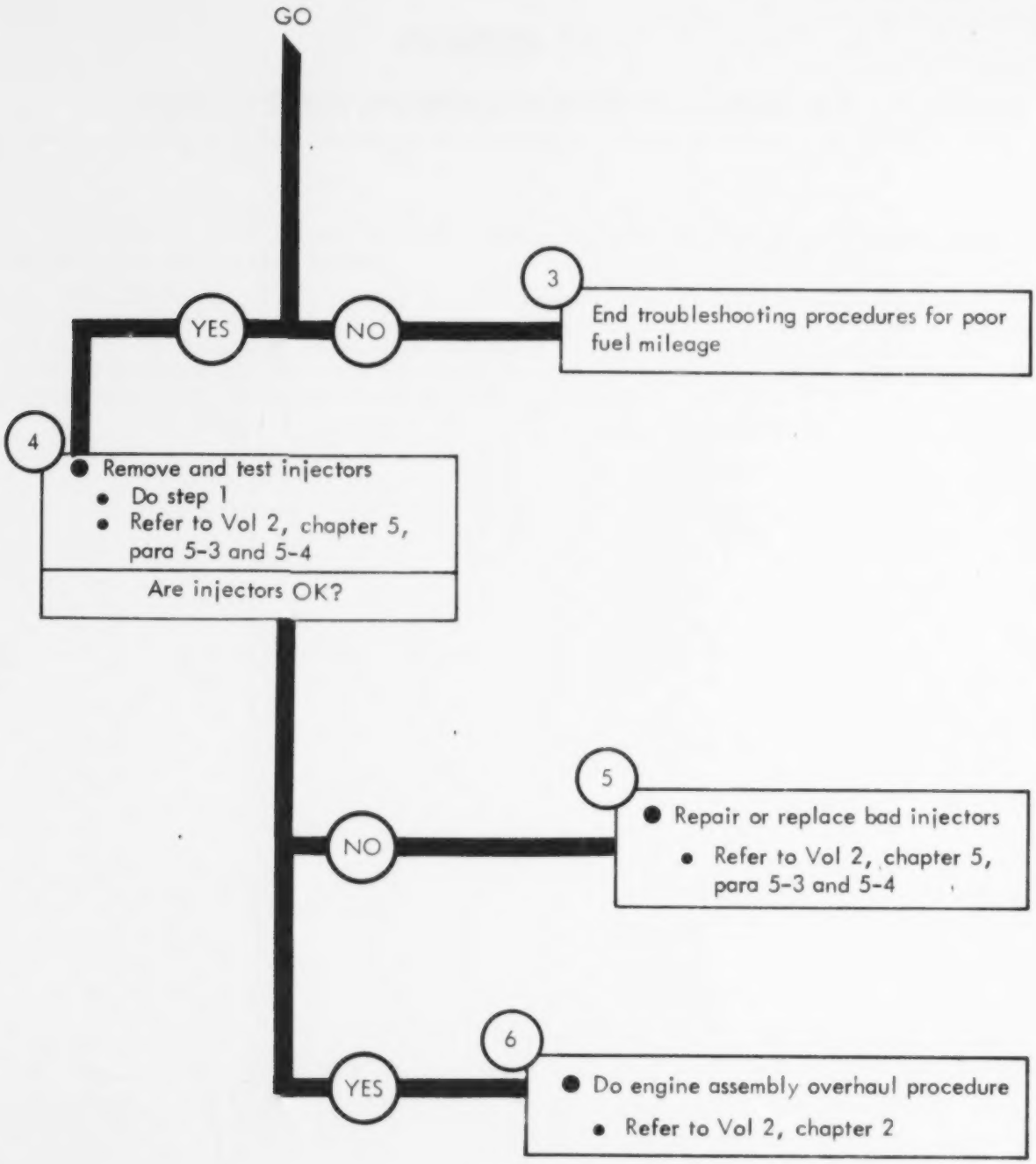


Figure 10-5 (Sheet 2 of 2)

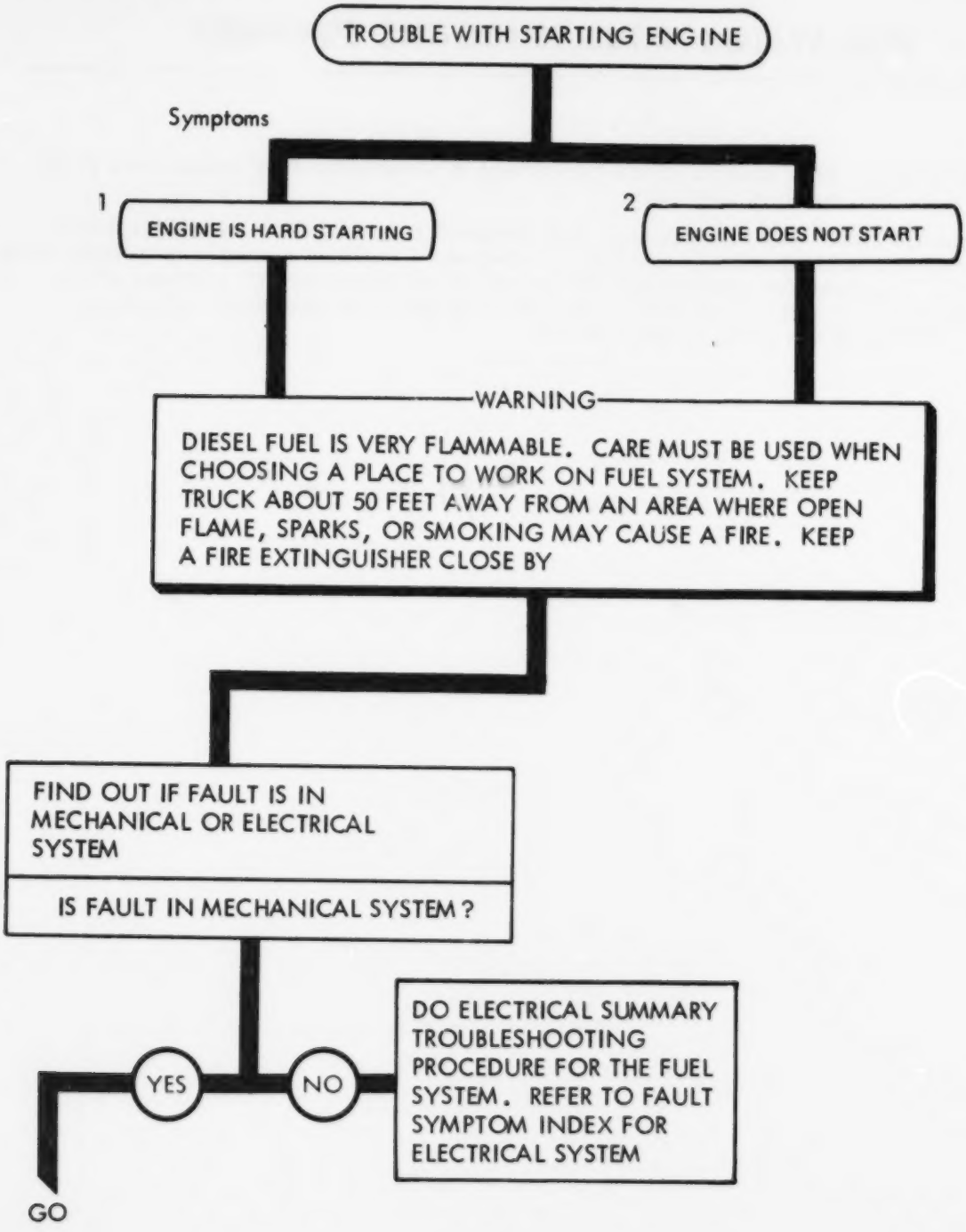
CHAPTER 11

FUEL SYSTEM TROUBLESHOOTING SUMMARY

11-1. GENERAL. This chapter gives a summary of troubleshooting procedures given in chapter 10, for the Fuel System.

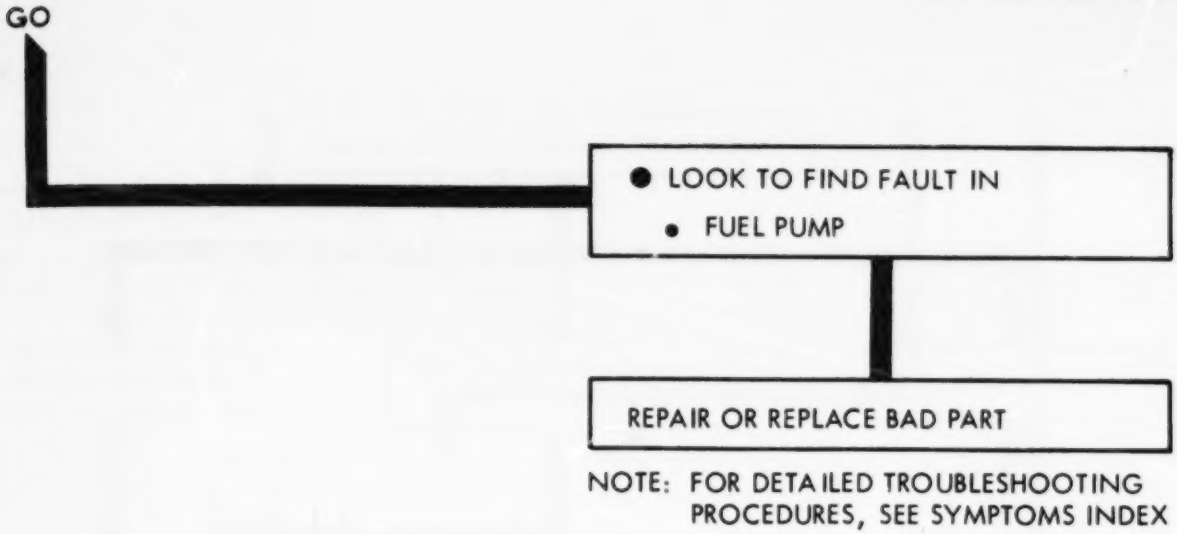
11-2. PROCEDURES. The summary in this chapter covers all fault symptoms found in the detailed troubleshooting procedures. Chapter 7 outlines a sample troubleshooting procedure. The summary procedures are based on the "what-to-do" portions of the detailed procedures and do not include the "how-to-do-it" instructions. Warnings, cautions, and notes are given where needed.

FUEL SYSTEM TROUBLESHOOTING SUMMARY


TROUBLE WITH STARTING ENGINE
Symptoms
1
ENGINE IS HARD STARTING
2
ENGINE DOES NOT START
WARNING
DIESEL FUEL IS VERY FLAMMABLE. CARE MUST BE USED WHEN CHOOSING A PLACE TO WORK ON FUEL SYSTEM. KEEP TRUCK ABOUT 50 FEET AWAY FROM AN AREA WHERE OPEN FLAME, SPARKS, OR SMOKING MAY CAUSE A FIRE. KEEP A FIRE EXTINGUISHER CLOSE BY
FIND OUT IF FAULT IS IN MECHANICAL OR ELECTRICAL SYSTEM
IS FAULT IN MECHANICAL SYSTEM?
YES
NO
DO ELECTRICAL SUMMARY TROUBLESHOOTING PROCEDURE FOR THE FUEL SYSTEM. REFER TO FAULT SYMPTOM INDEX FOR ELECTRICAL SYSTEM
GO

TA 118175

Figure 11-1 (Sheet 1 of 6)


GO
● LOOK TO FIND FAULT IN
• FUEL PUMP
REPAIR OR REPLACE BAD PART
NOTE: FOR DETAILED TROUBLESHOOTING PROCEDURES, SEE SYMPTOMS INDEX

TA 118176

Figure 11-1 (Sheet 2 of 6)

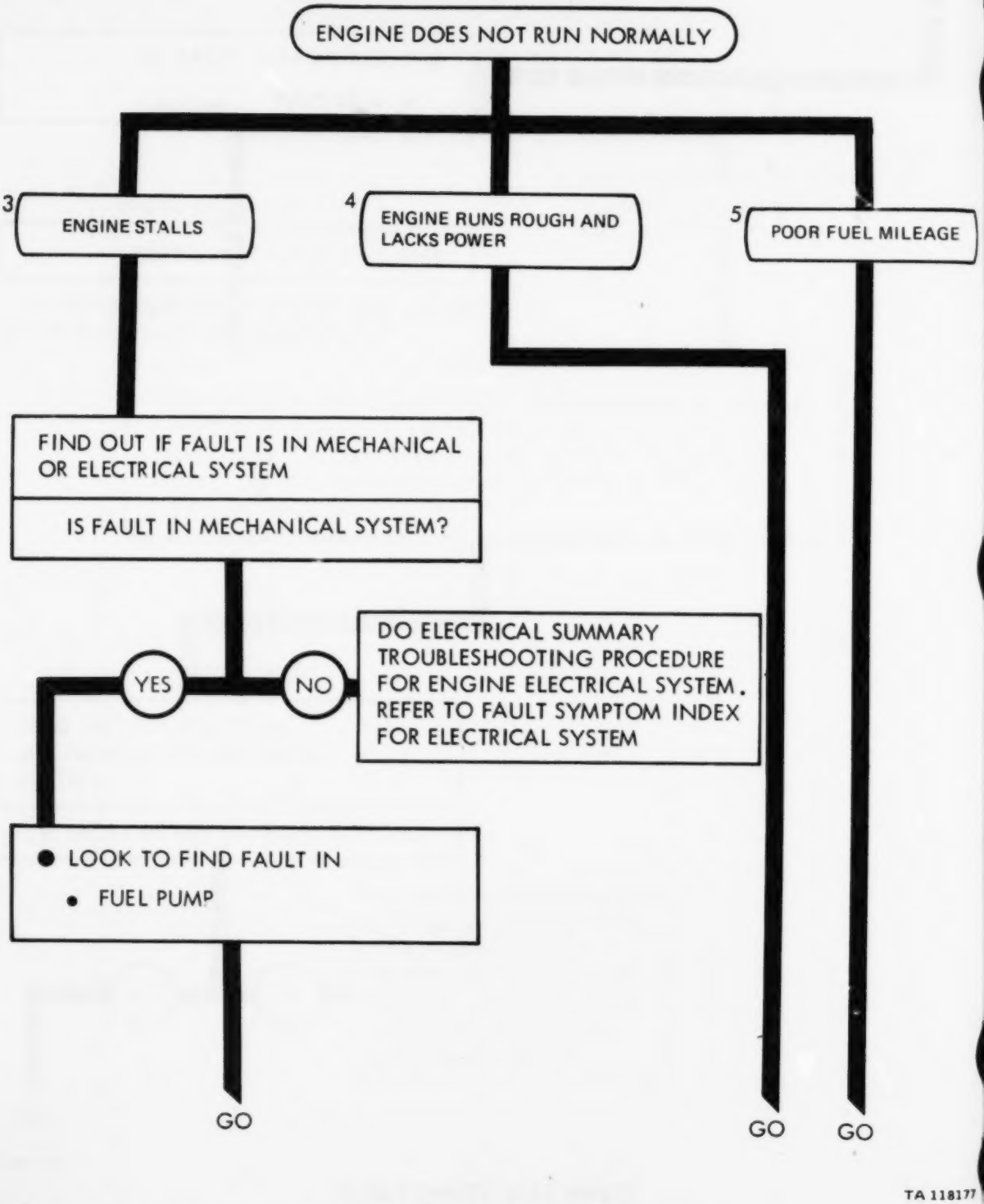
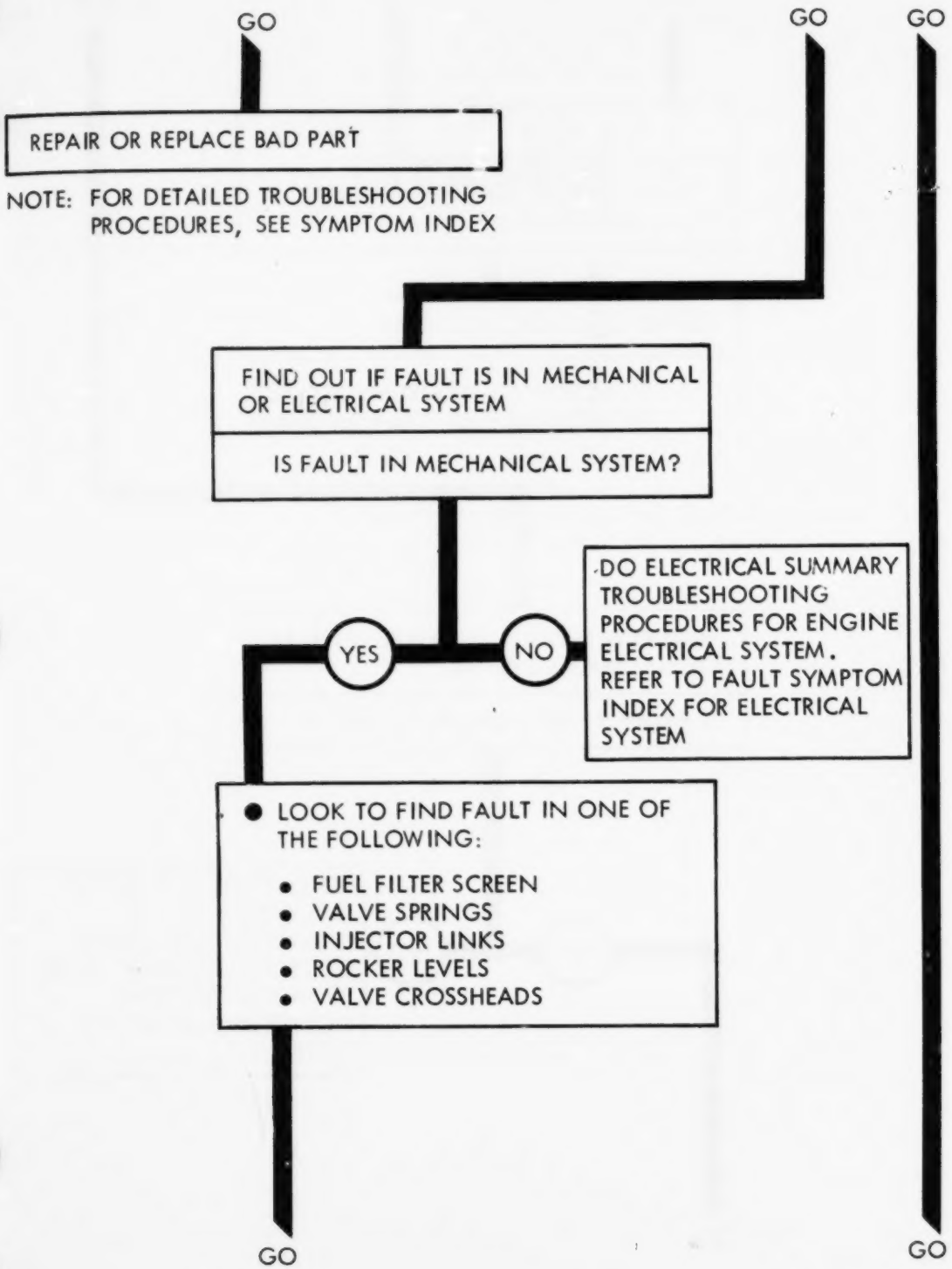


Figure 11-1 (Sheet 3 of 6)


GO
GO
GO
REPAIR OR REPLACE BAD PART
NOTE: FOR DETAILED TROUBLESHOOTING PROCEDURES, SEE SYMPTOM INDEX
FIND OUT IF FAULT IS IN MECHANICAL OR ELECTRICAL SYSTEM
IS FAULT IN MECHANICAL SYSTEM?
YES
NO
DO ELECTRICAL SUMMARY TROUBLESHOOTING PROCEDURES FOR ENGINE ELECTRICAL SYSTEM. REFER TO FAULT SYMPTOM INDEX FOR ELECTRICAL SYSTEM
LOOK TO FIND FAULT IN ONE OF THE FOLLOWING:
FUEL FILTER SCREEN
VALVE SPRINGS
INJECTOR LINKS
ROCKER LEVELS
VALVE CROSSHEADS
GO
GO

TA 118178

Figure 11-1 (Sheet 4 of 6)

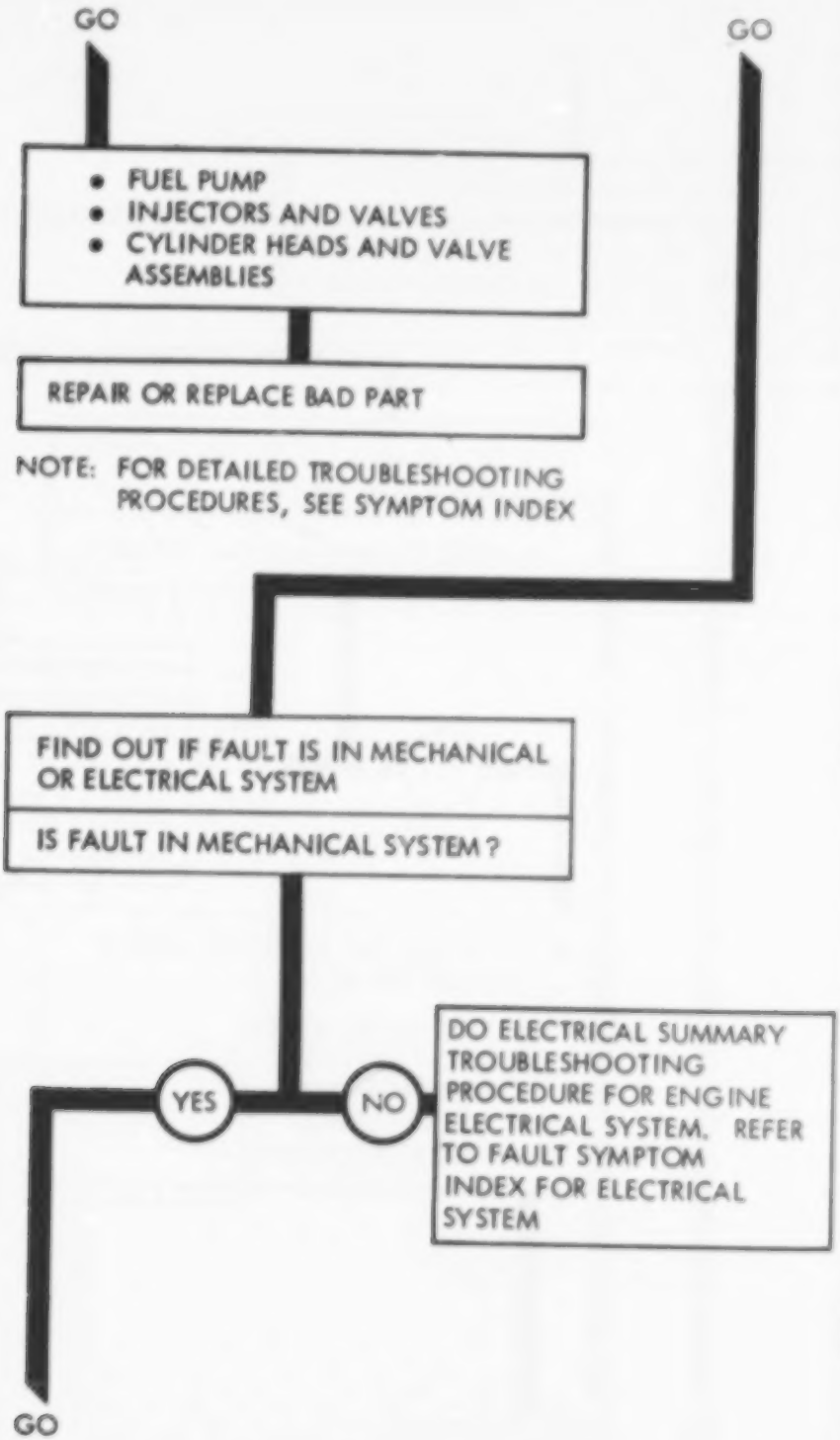
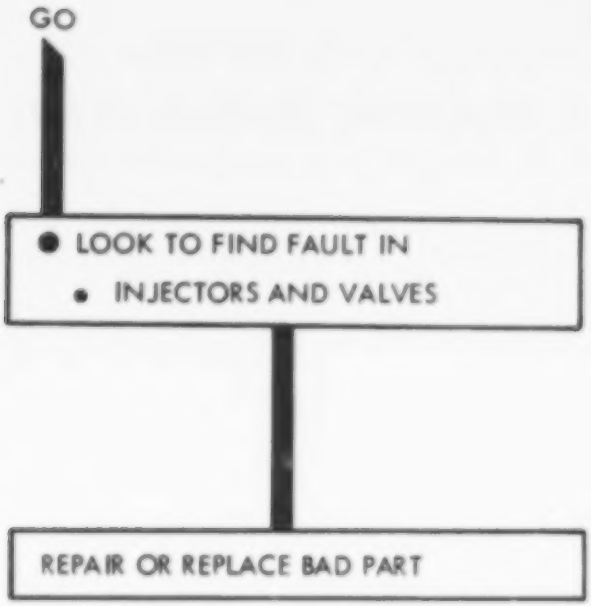

GO
GO
• FUEL PUMP
• INJECTORS AND VALVES
• CYLINDER HEADS AND VALVE ASSEMBLIES
REPAIR OR REPLACE BAD PART
NOTE: FOR DETAILED TROUBLESHOOTING PROCEDURES, SEE SYMPTOM INDEX
FIND OUT IF FAULT IS IN MECHANICAL OR ELECTRICAL SYSTEM
IS FAULT IN MECHANICAL SYSTEM?
YES
NO
DO ELECTRICAL SUMMARY TROUBLESHOOTING PROCEDURE FOR ENGINE ELECTRICAL SYSTEM. REFER TO FAULT SYMPTOM INDEX FOR ELECTRICAL SYSTEM
GO
TA 118179

Figure 11-1 (Sheet 5 of 6)


GO
LOOK TO FIND FAULT IN
INJECTORS AND VALVES
REPAIR OR REPLACE BAD PART
NOTE: FOR DETAILED TROUBLESHOOTING PROCEDURES, SEE SYMPTOM INDEX

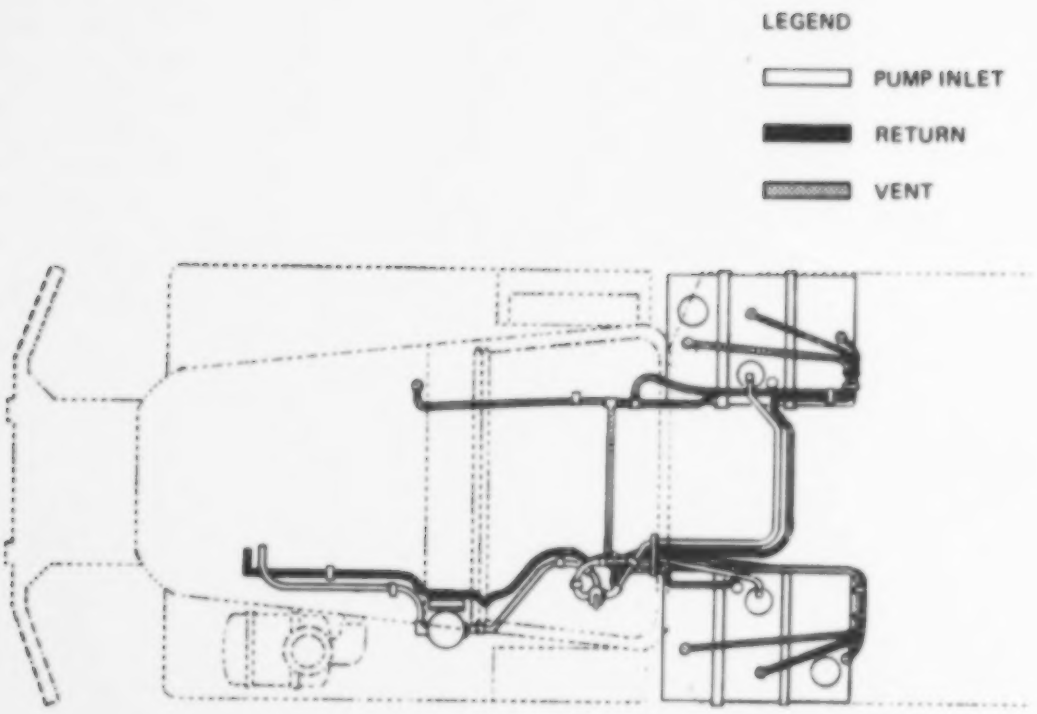
TA 116180

Figure 11-1 (Sheet 6 of 6)

CHAPTER 12

FUEL SYSTEM SUPPORT DIAGRAMS

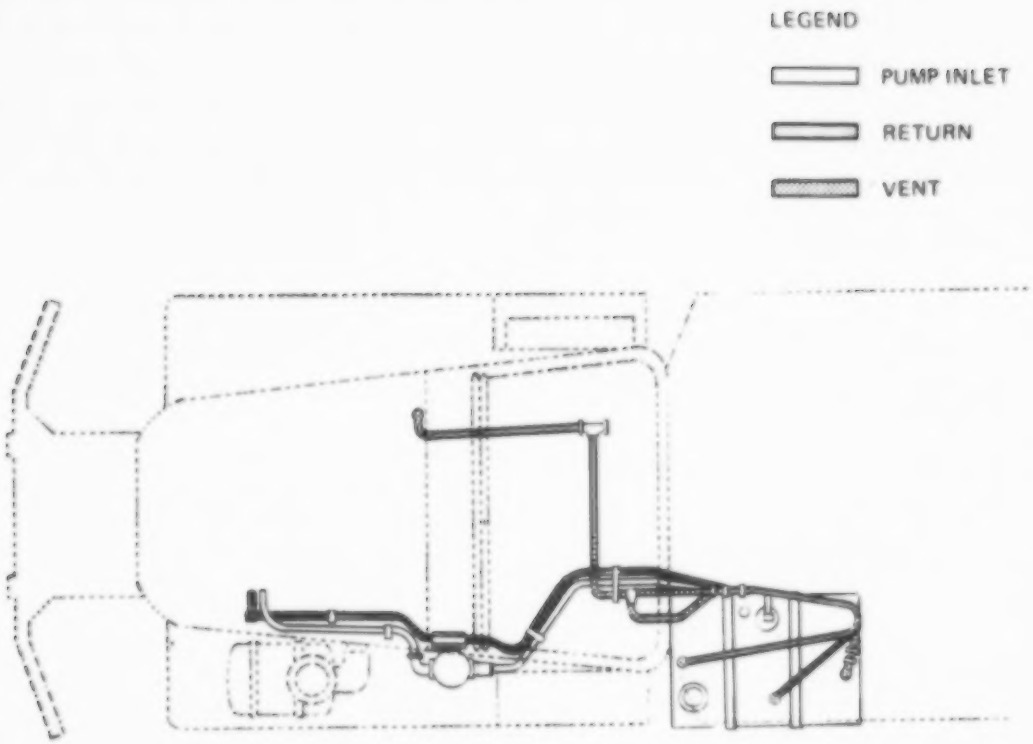
12-1. GENERAL. This chapter gives the diagrams you need when doing trouble-shooting procedures in chapter 10. Figure 3-1 is a complete listing of all support diagrams used in this manual.



ON M816, M817 AND M818 TRUCKS

TA 118181

Figure 12-1. Fuel Lines (Sheet 1 of 2)



ON M813, M813A1, M814, M815, M819, M820, M820A1, AND M820A2 TRUCKS

TA 116182

Figure 12-1. Fuel Lines (Sheet 2 of 2)

CHAPTER 13

FUEL SYSTEM TEST PROCEDURES

13-1. GENERAL. This chapter gives test procedures for the tests given in chapter 11, for the Fuel System.

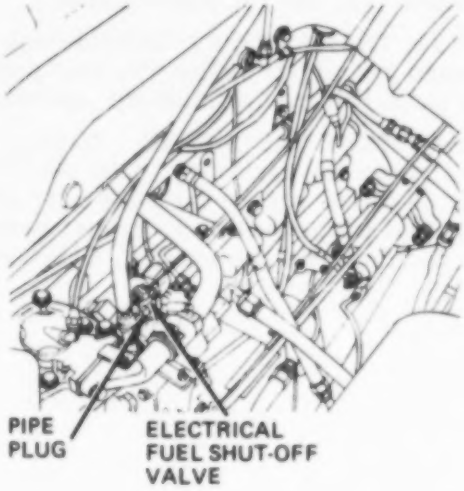
13-2. TEST SET-UP. Instructions for setup of test equipment and parts to be tested are given before the test procedures. Illustrations are used, when needed, to show you how to hook up the test equipment to the part to be tested.

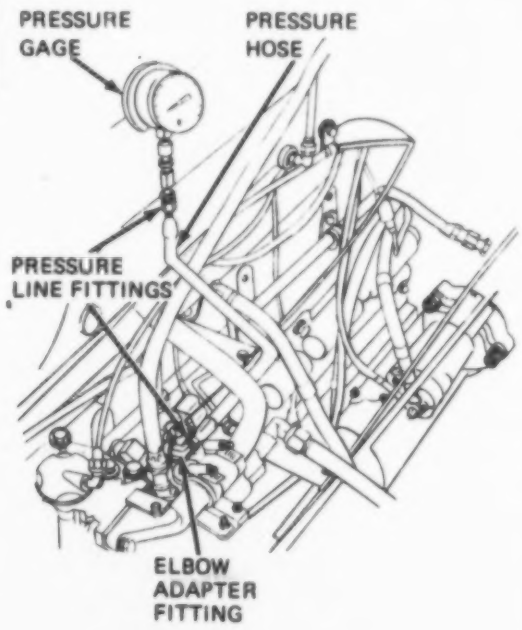
13-3. TEST PROCEDURE. Detailed step-by-step instructions, in flow chart form, are given for each test. The procedure calls out the type of test and the condition of the truck system for each part of testing. The step-by-step test will lead you to the bad component or to a fault symptom within a related system. Reference is made to the fault symptom index, chapter 6, if the test shows a fault in another system.

FUEL PUMP PRESSURE TEST - To measure fuel pump pressure at the fuel pump at idle and full throttle speeds

1

- Set up Gage as Follows:
  - Using 7/16-inch wrench unscrew and take out pipe plug in electrical fuel shutoff valve
  - Put elbow adapter fitting in electrical fuel shutoff valve and screw it in, hand tight
  - Using 7/16-inch wrench tighten elbow adapter fitting
  - Screw pressure line fittings into elbow adapter and gage, hand tight
  - Using 7/16-inch wrench tighten pressure line fittings





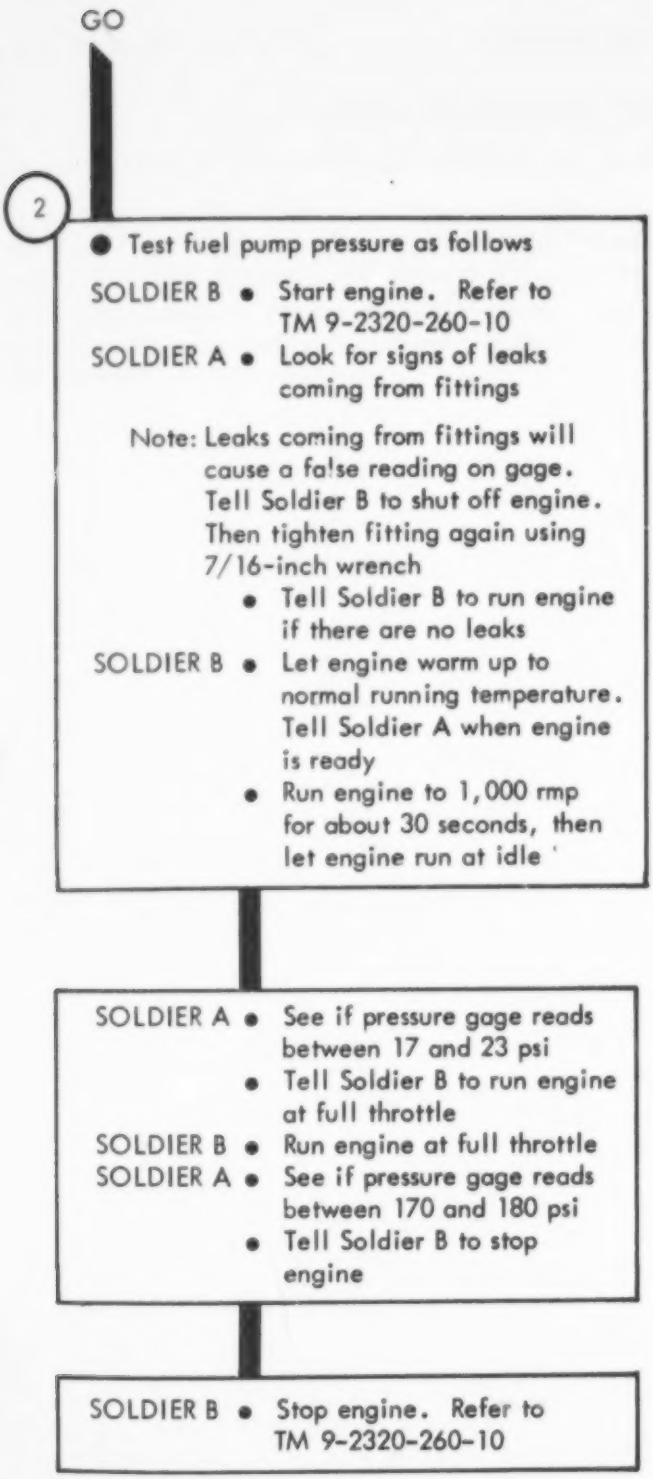
NOTE

The next step will need the use of two soldiers. The lead soldier will be called Soldier A and the helper will be called Soldier B.

GO

TA 118183

Figure 13-1 (Sheet 1 of 2)


GO
2
• Test fuel pump pressure as follows
SOLDIER B • Start engine. Refer to TM 9-2320-260-10
SOLDIER A • Look for signs of leaks coming from fittings
Note: Leaks coming from fittings will cause a false reading on gage. Tell Soldier B to shut off engine. Then tighten fitting again using 7/16-inch wrench
• Tell Soldier B to run engine if there are no leaks
SOLDIER B • Let engine warm up to normal running temperature. Tell Soldier A when engine is ready
• Run engine to 1,000 rmp for about 30 seconds, then let engine run at idle
SOLDIER A • See if pressure gage reads between 17 and 23 psi
• Tell Soldier B to run engine at full throttle
SOLDIER B • Run engine at full throttle
SOLDIER A • See if pressure gage reads between 170 and 180 psi
• Tell Soldier B to stop engine
SOLDIER B • Stop engine. Refer to TM 9-2320-260-10

TA 118184

Figure 13-1 (Sheet 2 of 2)

CHAPTER 14

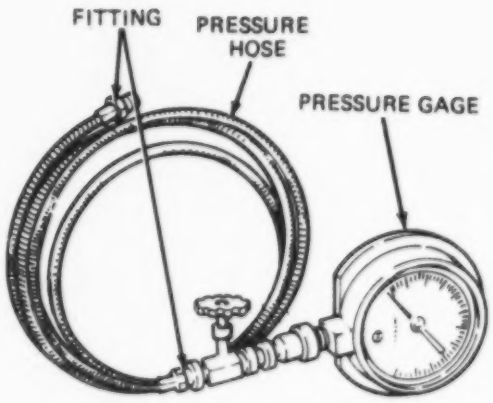
FUEL PRESSURE GAGE CHECK

14-1. EQUIPMENT ITEMS COVERED. This chapter gives equipment procedures for the Fuel Pressure Gage Check, for which there are authorized corrective maintenance tasks at direct support and general support level of maintenance.

14-2. EQUIPMENT ITEMS NOT COVERED. All equipment items for which corrective maintenance is authorized at direct support and general support level of maintenance are covered in this chapter.

GENERAL INSTRUCTIONS

- Check pressure gage before using
  - Gage - look to see that glass and needle are not broken
  - Pressure hose - look to see that there are no holes, cracks, or kinks
  - Fittings - feel if fittings are tight on both ends. Look to see that input end is dirt free



TA 118185

Figure 14-1

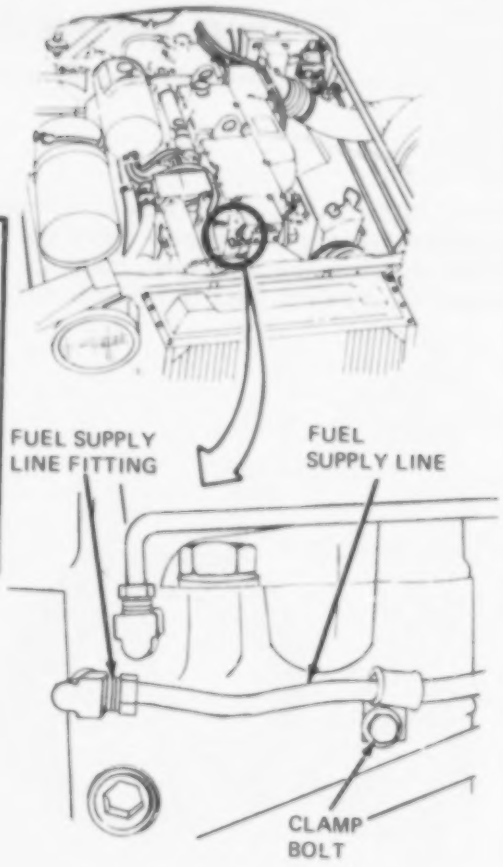
CHAPTER 15

FUEL SYSTEM CHECKOUT PROCEDURES

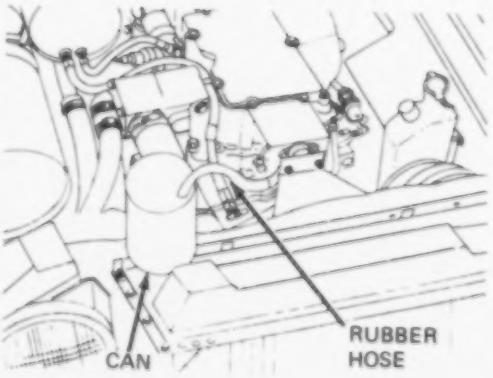
15-1. GENERAL. This chapter gives procedures for checking out the system after troubleshooting and repair have been done. Procedures are set up in flow chart form showing the checkout steps in order and referring to the fault symptom index when the system does not check out.

FUEL PUMP FLOW CHECK

- Check fuel flow from fuel pump
  - Using 1/2-inch wrench, unscrew fuel supply line fitting
  - Using 7/16-inch wrench, unscrew clamp bolt on fuel supply line
  - Take out clamp bolt and pull fuel supply line away from female fitting in cylinder head
  - Slide back the fitting on the fuel supply line



- Put one end of a rubber hose over the end of the fuel supply line
- Put other end of rubber hose in a can
- Crank engine for about ten seconds then stop. Refer to TM 9-2320-260-10
- See if fuel is in can



TA 118186

Figure 15-1

CHAPTER 16

FRONT AXLE SYSTEM TROUBLESHOOTING

16-1. EQUIPMENT ITEMS COVERED. This chapter gives equipment troubleshooting procedures for the Front Axle System, for which there are authorized corrective maintenance tasks at direct support and general support level of maintenance.

16-2. EQUIPMENT ITEMS NOT COVERED. All equipment items for which corrective maintenance is authorized at direct support and general support level of maintenance are covered in this chapter.

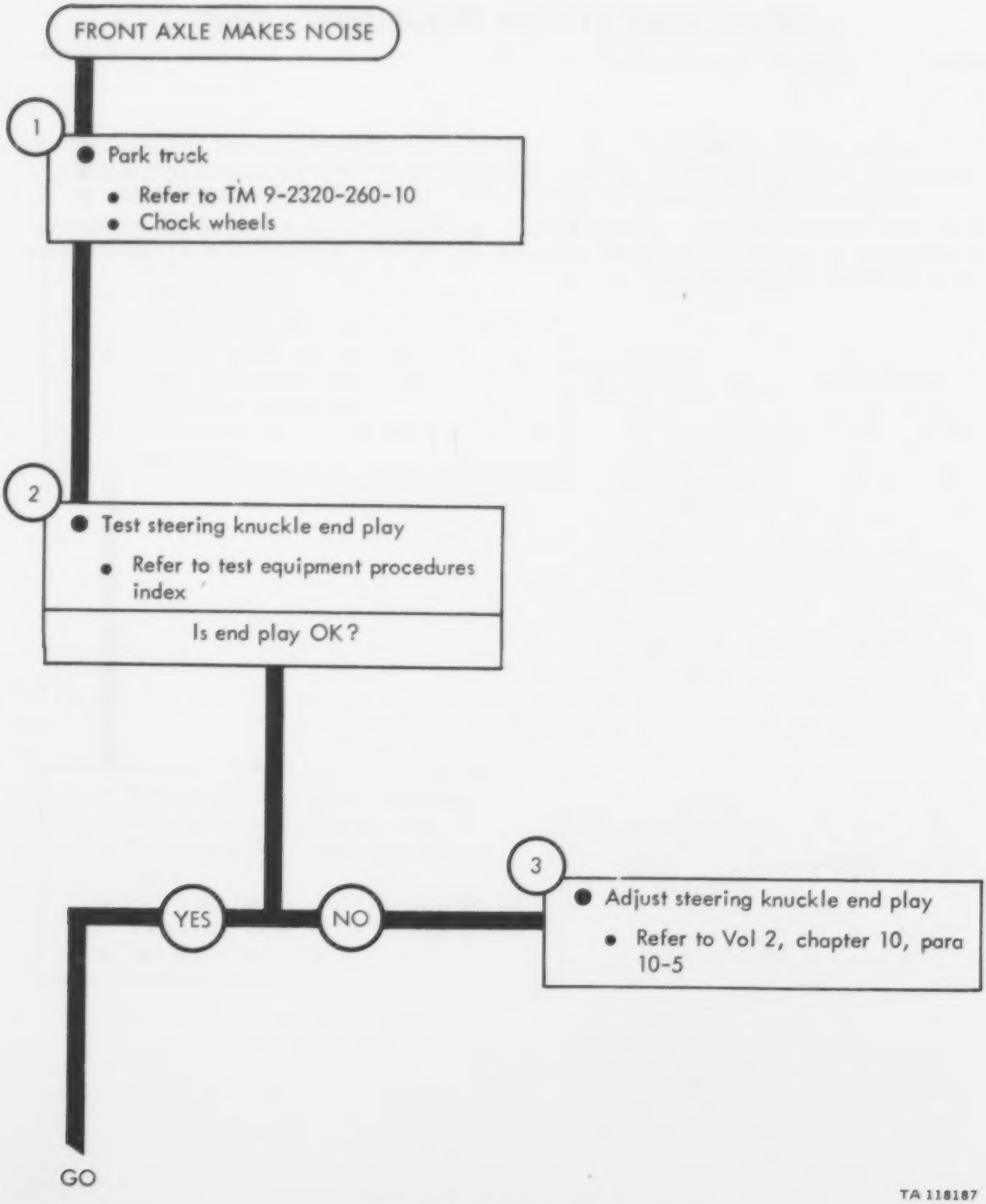


Figure 16-1 (Sheet 1 of 2)

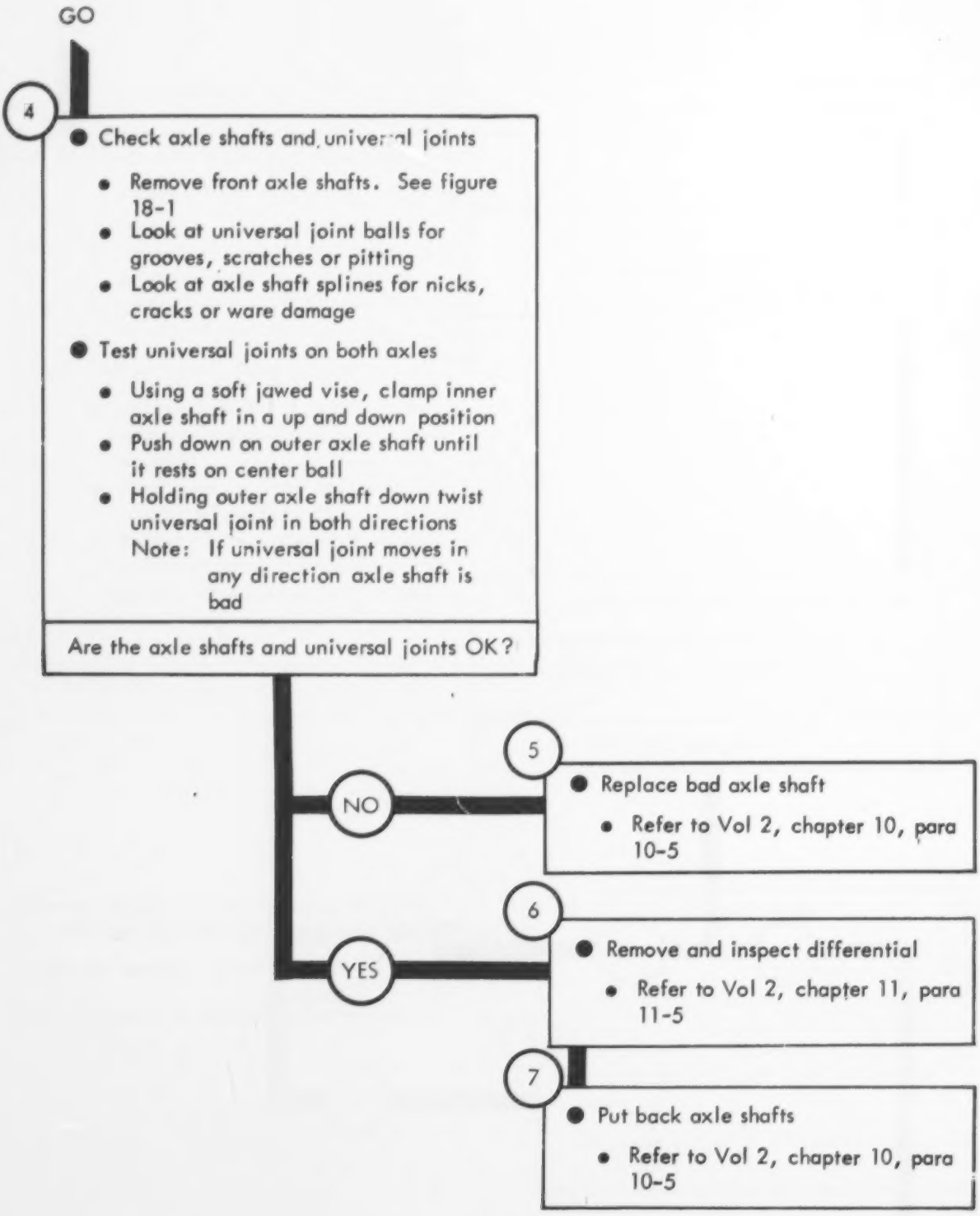

GO
4
● Check axle shafts and universal joints
• Remove front axle shafts. See figure 18-1
• Look at universal joint balls for grooves, scratches or pitting
• Look at axle shaft splines for nicks, cracks or ware damage
● Test universal joints on both axles
• Using a soft jawed vise, clamp inner axle shaft in a up and down position
• Push down on outer axle shaft until it rests on center ball
• Holding outer axle shaft down twist universal joint in both directions
Note: If universal joint moves in any direction axle shaft is bad
Are the axle shafts and universal joints OK?
NO
5
● Replace bad axle shaft
• Refer to Vol 2, chapter 10, para 10-5
YES
6
● Remove and inspect differential
• Refer to Vol 2, chapter 11, para 11-5
7
● Put back axle shafts
• Refer to Vol 2, chapter 10, para 10-5
TA 116188

Figure 16-1 (Sheet 2 of 2)

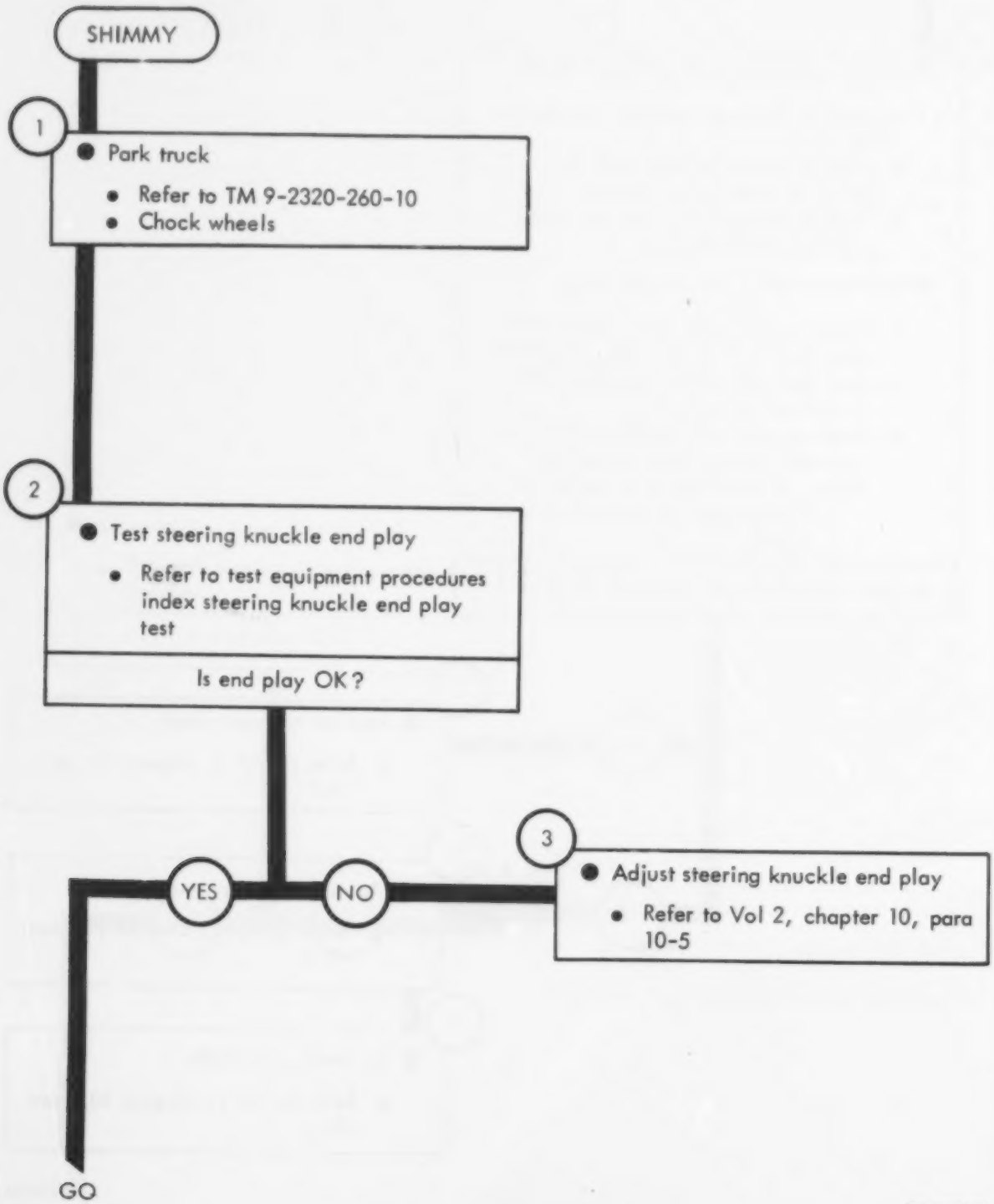


Figure 16-2 (Sheet 1 of 2)

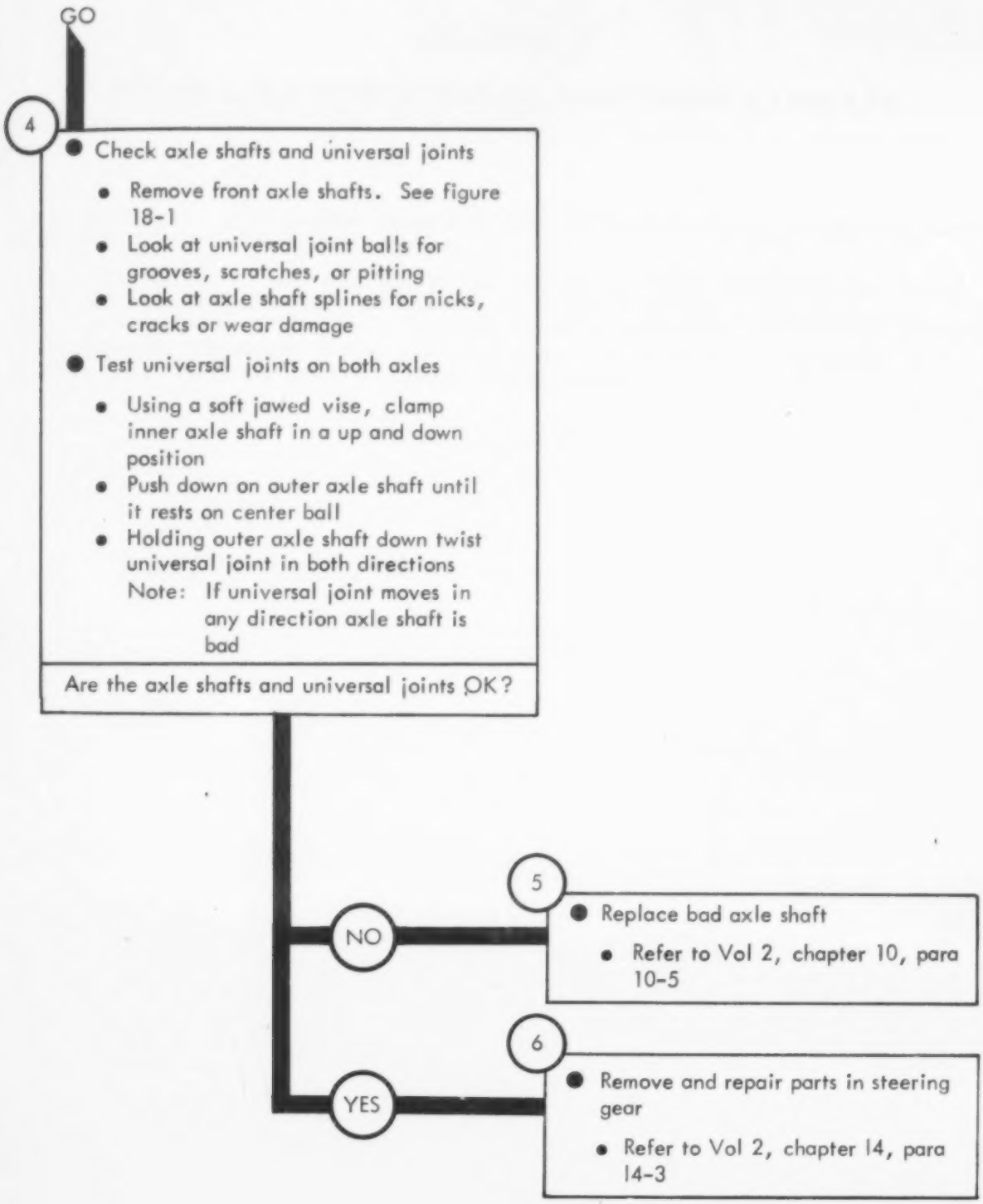

GO
4
Check axle shafts and universal joints
Remove front axle shafts. See figure 18-1
Look at universal joint balls for grooves, scratches, or pitting
Look at axle shaft splines for nicks, cracks or wear damage
Test universal joints on both axles
Using a soft jawed vise, clamp inner axle shaft in a up and down position
Push down on outer axle shaft until it rests on center ball
Holding outer axle shaft down twist universal joint in both directions
Note: If universal joint moves in any direction axle shaft is bad
Are the axle shafts and universal joints OK?
NO
5
Replace bad axle shaft
Refer to Vol 2, chapter 10, para 10-5
YES
6
Remove and repair parts in steering gear
Refer to Vol 2, chapter 14, para 14-3
TA 118190

Figure 16-2 (Sheet 2 of 2)

CHAPTER 17

FRONT AXLE SYSTEM TROUBLESHOOTING SUMMARY

17-1. GENERAL. This chapter gives a summary of troubleshooting procedures given in chapter 16 for the Front Axle System.

17-2. PROCEDURES. The summary in this chapter covers all fault symptoms found in the detailed troubleshooting procedures. Chapter 7 outlines a sample troubleshooting procedure. The summary procedures are based on the "what-to-do" portions of the detailed procedures and do not include the "how-to-do-it" instructions. Warnings, cautions, and notes are given where needed.

FRONT AXLE SYSTEM TROUBLESHOOTING SUMMARY

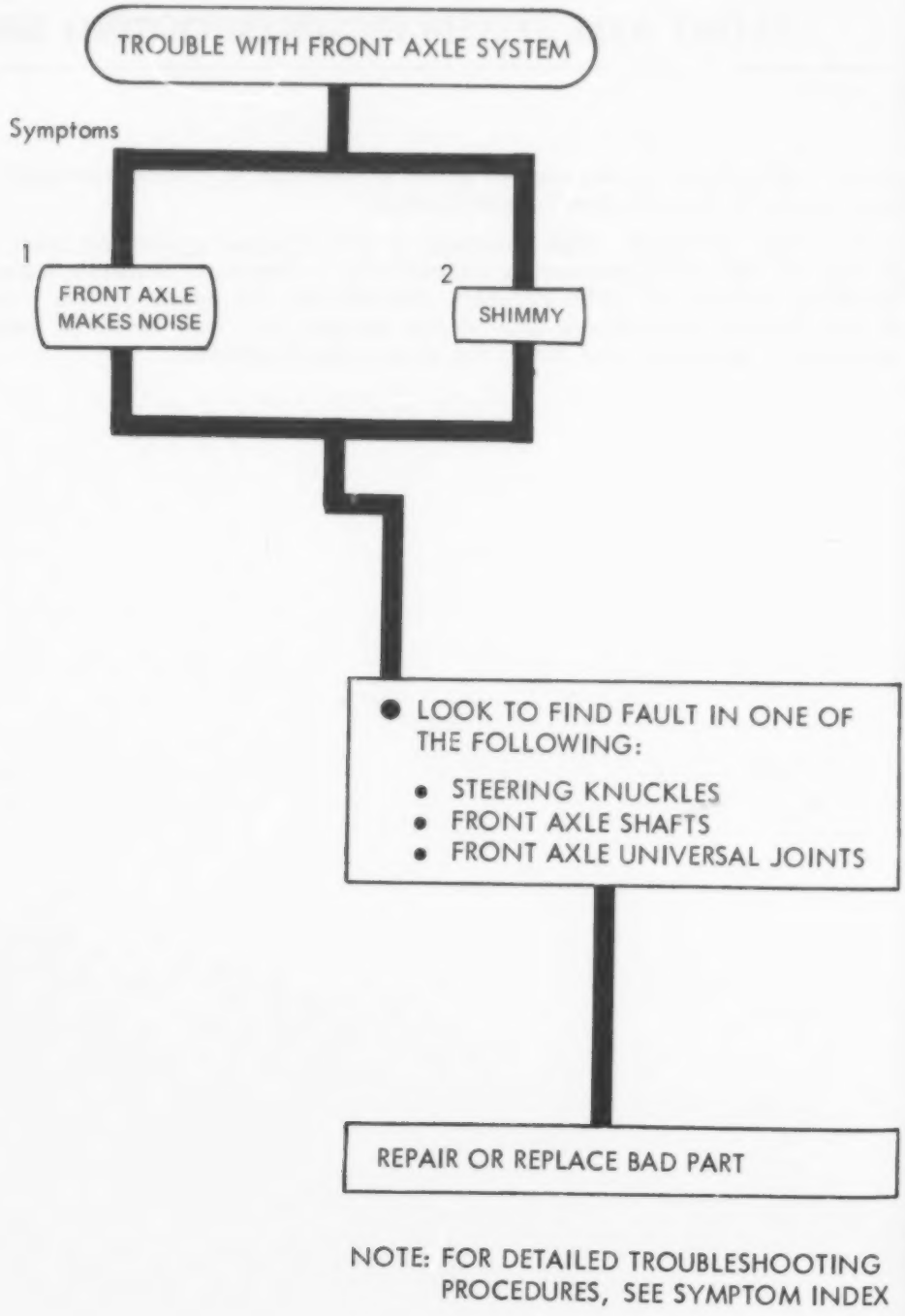
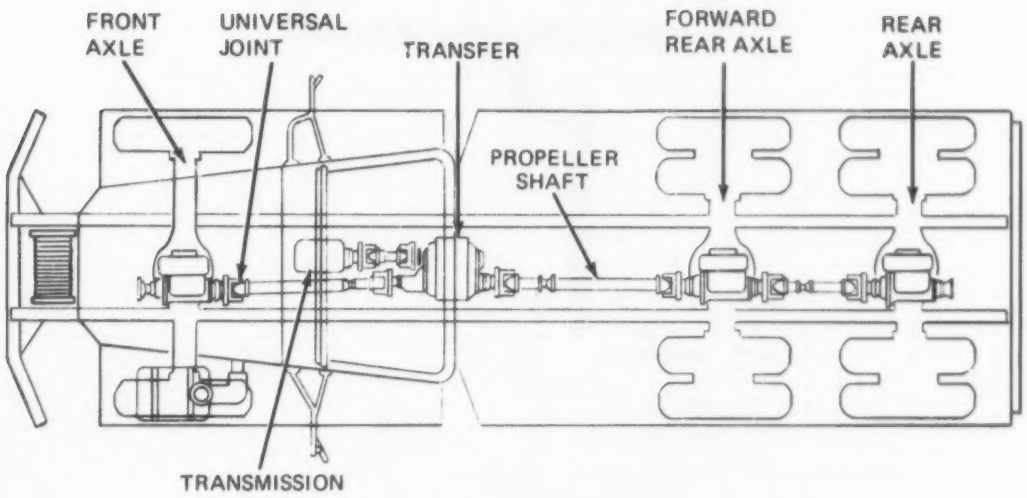


Figure 17-1

CHAPTER 18

FRONT AND REAR AXLE SYSTEM SUPPORT DIAGRAMS

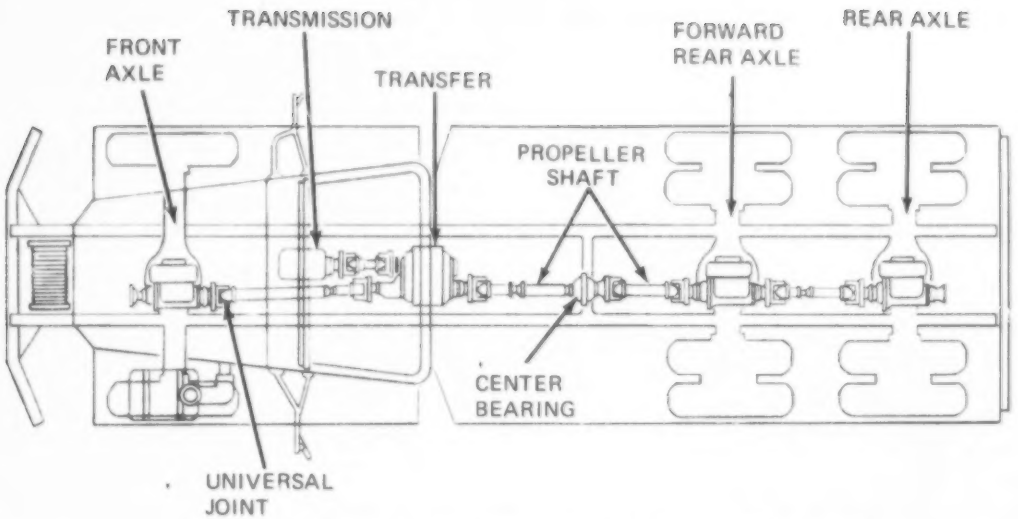
18-1. GENERAL. This chapter gives the diagrams you need when doing trouble-shooting procedures in chapter 16. Table 3-1 is a complete listing of all support diagrams used in this manual.



M813, M813A1, M815, M816, M817, M818

TA 118192

Figure 18-1. Front and Rear Axle Systems (Sheet 1 of 2)



M812, M812A1, M814, M819, M820, M820A1, M820A2, M821

TA 118193

Figure 18-1. Front and Rear Axle Systems (Sheet 2 of 2)

CHAPTER 19

FRONT AXLE SYSTEM TEST PROCEDURES

19-1. GENERAL. This chapter gives test procedures for the tests given in chapter 16, for the Front Axle System.

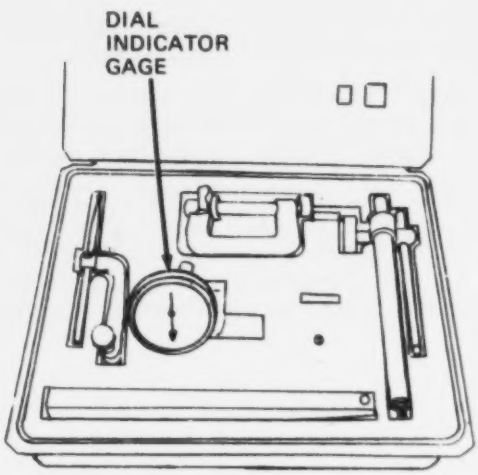
19-2. TEST SET-UP. Instructions for setup of test equipment and parts to be tested are given before the test procedures. Illustrations are used, when needed, to show you how to hook up the test equipment to the part to be tested.

19-3. TEST PROCEDURE. Detailed step-by-step instructions, in flow chart form, are given for each test. The procedure calls out the type of test and the condition of the truck system for each part of testing. The step-by-step test will lead you to the bad component or to a fault symptom within a related system. Reference is made to the fault symptom index, chapter 6, if the test shows a fault in another system.

best copy available

GENERAL INSTRUCTIONS

- Check dial indicator and accessories
  - Gage - look to see that glass and needle are not broken
  - Accessories - look to see that all mounting accessories are in case and not damaged



Test

STEERING KNUCKLE END PLAY TEST - To measure steering knuckle end play

NOTE

Steering knuckle end play should be checked on both wheels

GO

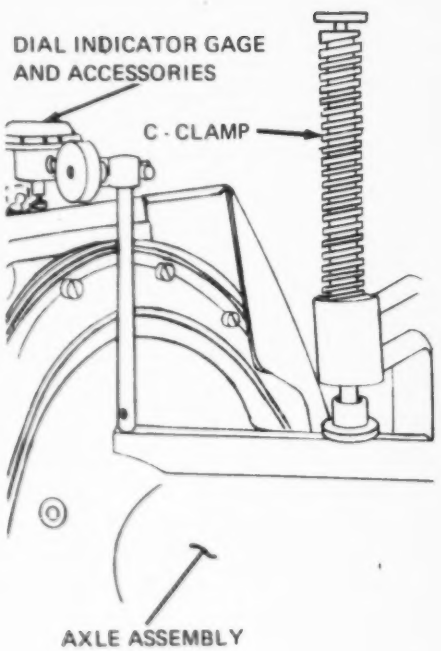
TA 118194

Figure 19-1 (Sheet 1 of 2)

GO

1

- Set up dial indicator as follows
  - Assemble dial indicator and clamp it to axle assembly using a six-inch C clamp
  - Set moveable pointer of dial indicator on steering knuckle arm just behind grease fitting



2

- Test steering knuckle end play as follows
  - Set moveable pointer on dial indicator to 0
  - Using jack, raise front wheel off ground. Refer to TM 9-2320-260-10 for jacking procedure
  - Look at dial indicator to see if reading is between 0.005 and 0.013 inch

3

- Take dial indicator off of axle
  - Unscrew C-clamp and take off gage
  - Take apart dial indicator accessories and put back in case

TA 118195

Figure 19-1 (Sheet 2 of 2)

CHAPTER 20

REAR AXLE SYSTEM TROUBLESHOOTING

20-1. EQUIPMENT ITEMS COVERED. This chapter gives equipment troubleshooting procedures for the Rear Axle System for which there are authorized corrective maintenance tasks at direct support and general support level of maintenance.

20-2. EQUIPMENT ITEMS NOT COVERED. All equipment items for which corrective maintenance is authorized at direct support and general support level of maintenance are covered in this chapter.

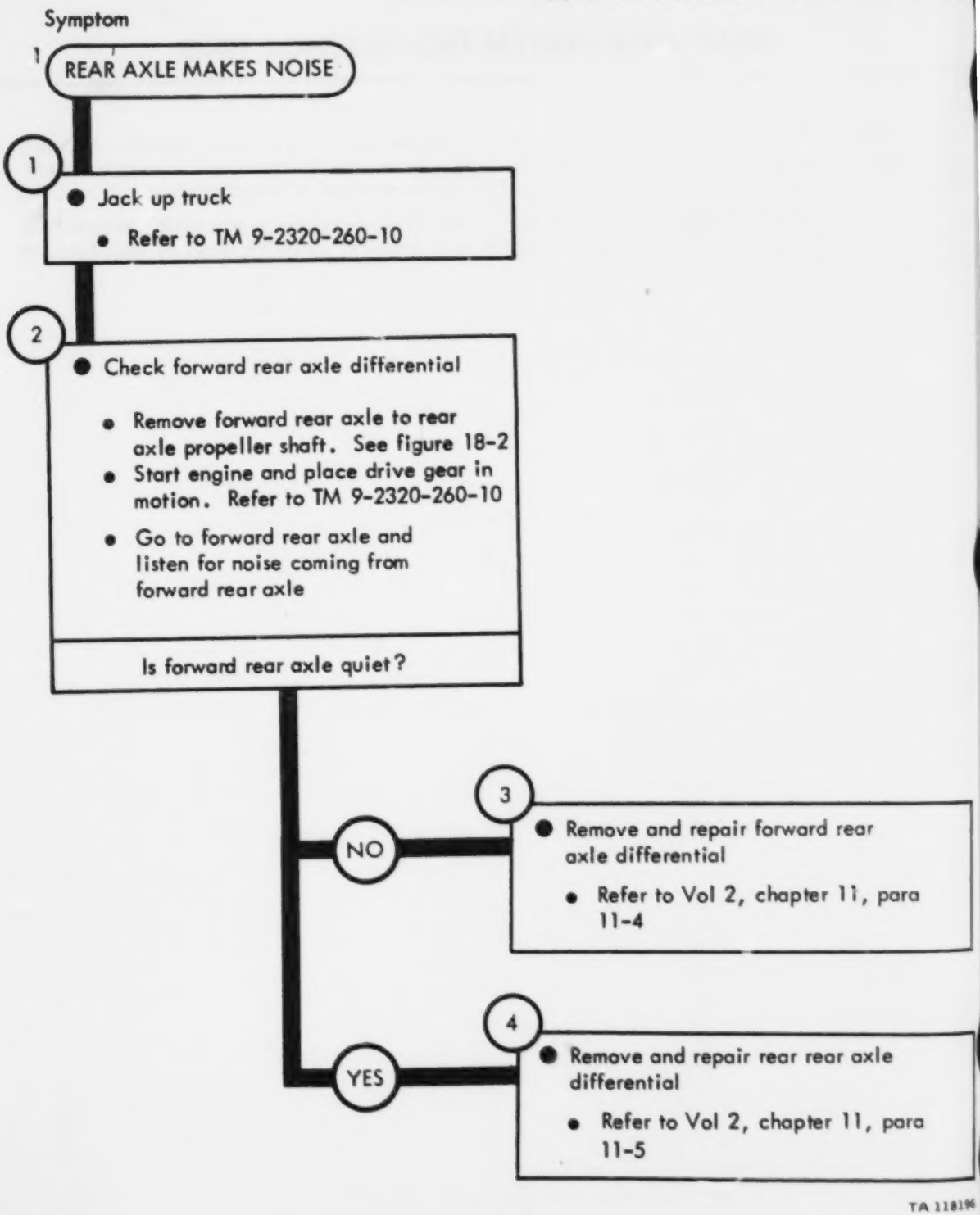

Symptom
REAR AXLE MAKES NOISE
1
Jack up truck
Refer to TM 9-2320-260-10
2
Check forward rear axle differential
Remove forward rear axle to rear axle propeller shaft. See figure 18-2
Start engine and place drive gear in motion. Refer to TM 9-2320-260-10
Go to forward rear axle and listen for noise coming from forward rear axle
Is forward rear axle quiet?
NO
3
Remove and repair forward rear axle differential
Refer to Vol 2, chapter 11, para 11-4
YES
4
Remove and repair rear rear axle differential
Refer to Vol 2, chapter 11, para 11-5
TA 118196

Figure 20-1

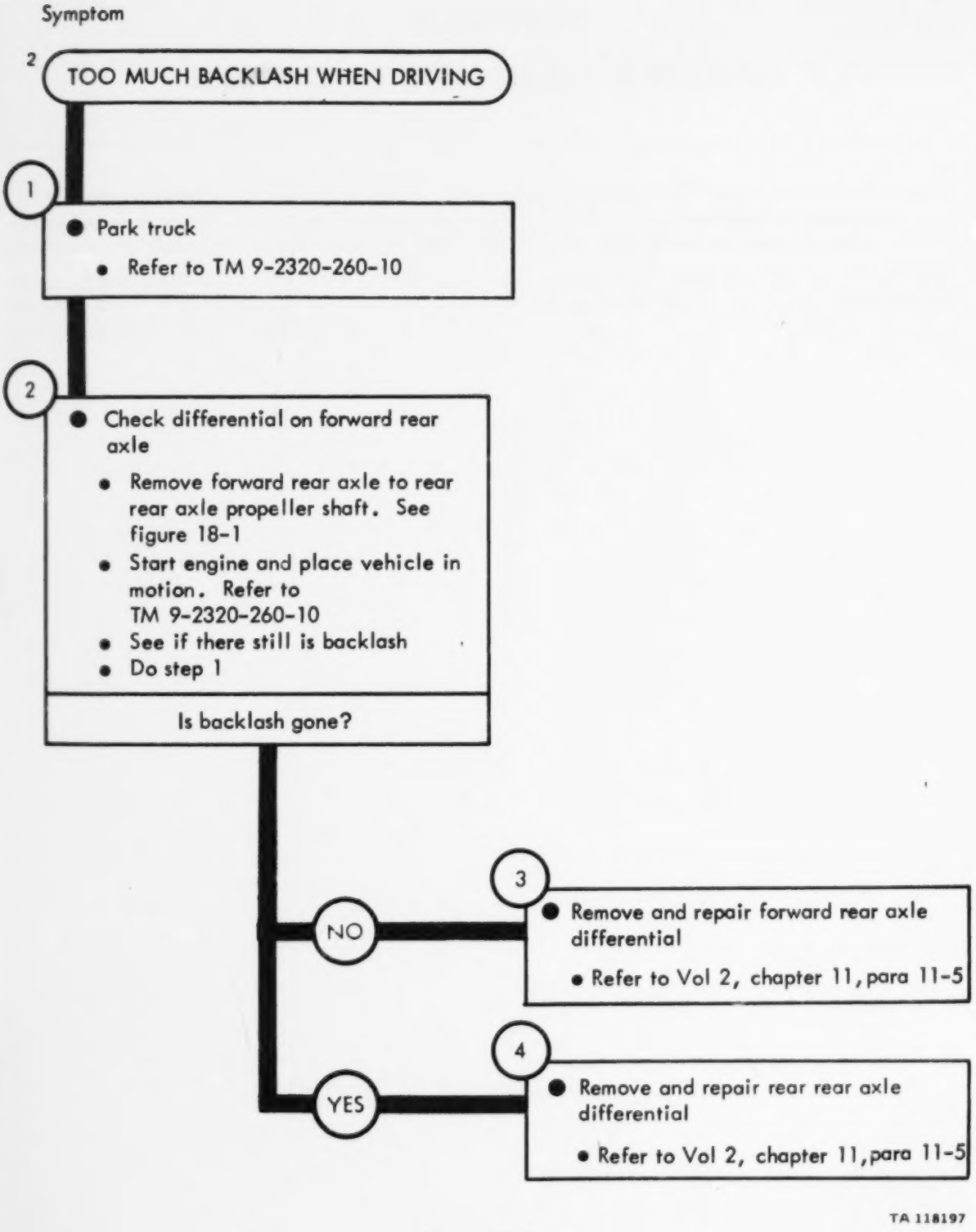

Symptom
2
TOO MUCH BACKLASH WHEN DRIVING
1
● Park truck
• Refer to TM 9-2320-260-10
2
● Check differential on forward rear axle
• Remove forward rear axle to rear rear axle propeller shaft. See figure 18-1
• Start engine and place vehicle in motion. Refer to TM 9-2320-260-10
• See if there still is backlash
• Do step 1
Is backlash gone?
NO
3
● Remove and repair forward rear axle differential
• Refer to Vol 2, chapter 11, para 11-5
YES
4
● Remove and repair rear rear axle differential
• Refer to Vol 2, chapter 11, para 11-5
TA 118197

Figure 20-2

CHAPTER 21

ELECTRICAL SYSTEM TROUBLESHOOTING

21-1. EQUIPMENT ITEMS COVERED. This chapter gives equipment troubleshooting procedures for the Electrical System, for which there are authorized corrective maintenance tasks at direct support and general support level of maintenance.

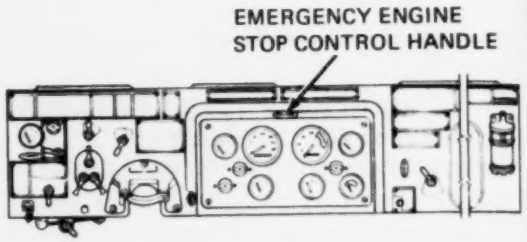
21-2. EQUIPMENT ITEMS NOT COVERED. All equipment items for which corrective maintenance is authorized at direct support and general support level of maintenance are covered in this chapter.

Symptom

1 ENGINE CRANKS BUT DOES NOT START

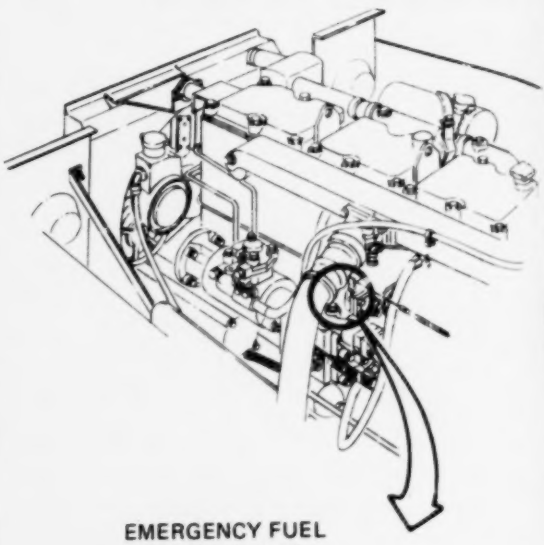
NOTE

When checking voltage, +24 volts DC means a range of +23 to +26 volts DC



1

- Park truck
  - Refer to TM 9-2320-260-10

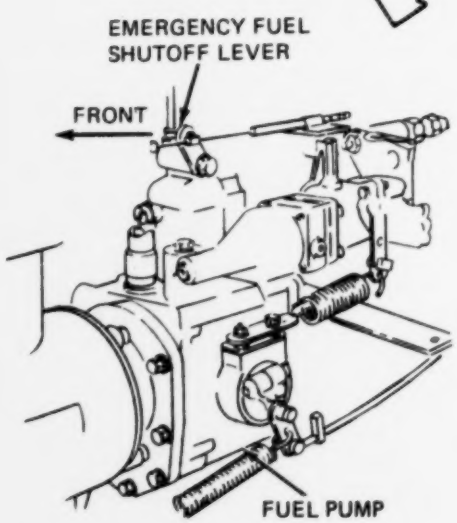


2

- Check setting of EMERGENCY ENGINE STOP control handle and emergency fuel shutoff lever
  - See if EMERGENCY ENGINE STOP control handle is all the way in. If not, push it all the way in
  - See if emergency fuel shutoff lever is all the way to front of fuel pump. If not, push it all the way to the front

Were both the EMERGENCY ENGINE STOP control handle and emergency fuel shutoff lever set right before you pushed them?

GO



TA 118301

Figure 21-1 (Sheet 1 of 7)

GO

YES

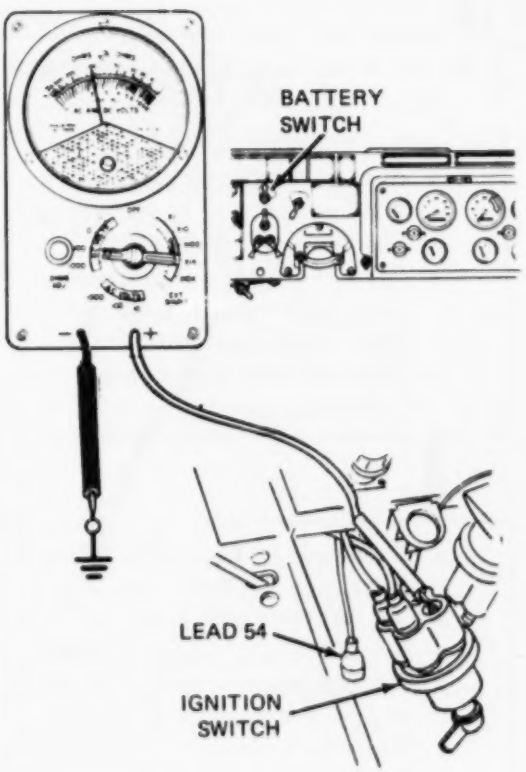
NO

3

- Fault has been corrected
  - Troubleshooting completed

4

- Check that IGNITION switch is OK
  - Take IGNITION switch off instrument panel and let it hang from leads. Refer to TM 9-2320-260-20
  - Take off lead 54 from IGNITION switch
  - Set BATTERY switch to ON
  - Set IGNITION switch to RUN



- Set multimeter to measure +24 volts DC. Refer to TM 9-2320-260-20
- Put multimeter - lead on a good ground
- Put multimeter + lead on lead 54 contact of IGNITION switch
- Read multimeter. Multimeter should measure +24 volts DC

Does multimeter measure +24 volts DC?

GO

TA 118302

Figure 21-1 (Sheet 2 of 7)

GO

YES

NO

5

- Replace IGNITION switch
  - Set BATTERY switch to OFF
  - Replace IGNITION switch. Refer to TM 9-2320-260-20

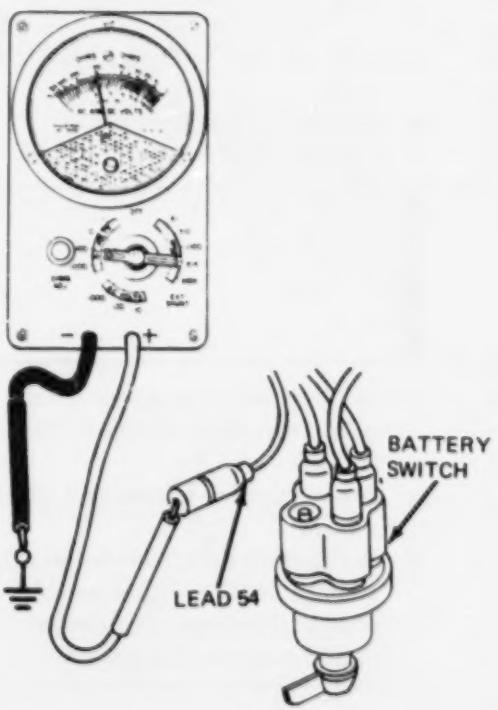
6

- Check that lead 54 from IGNITION switch to BATTERY switch is OK
  - Set BATTERY switch to OFF
  - Set IGNITION switch to OFF
  - Put lead 54 back in IGNITION switch
  - Put IGNITION switch back on instrument panel. Refer to TM 9-2320-260-20
  - Take BATTERY switch from instrument panel.

- Take lead 54 from IGNITION switch off BATTERY switch
- Set BATTERY switch to ON
- Set IGNITION switch to RUN
- Put multimeter – lead on a good ground and multimeter + lead on lead 54 contact
- Read multimeter. Multimeter should read +24 volts DC

Does multimeter read +24 volts DC?

GO



TA 118303

Figure 21-1 (Sheet 3 of 7)

GO

YES

NO

7

- Repair or replace front harness
  - Set BATTERY switch to OFF
  - Set IGNITION switch to OFF
  - Repair or replace front harness. Refer to Vol 2, chapter 7, para 7-9

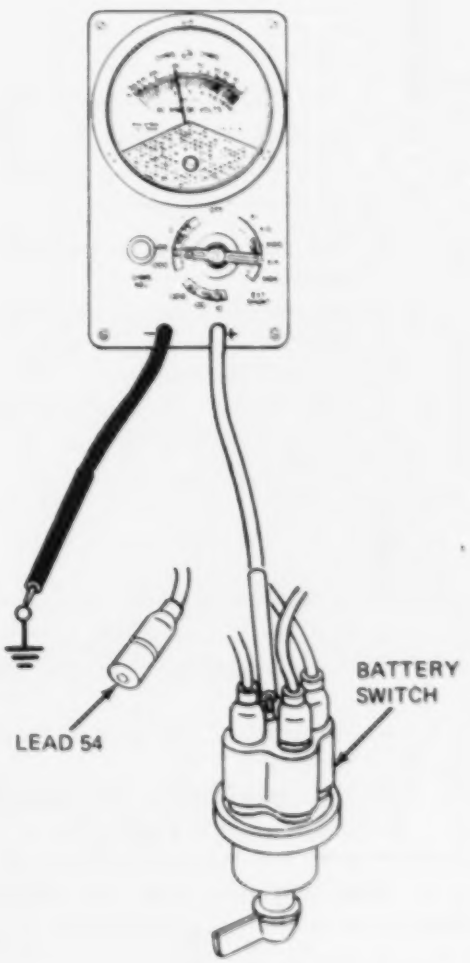
8

- Check that BATTERY switch is OK
  - Set BATTERY switch to OFF
  - Set IGNITION switch to OFF
  - Put lead 54 back on BATTERY switch
  - Take off other lead 54 from BATTERY switch

- Set BATTERY switch to ON
- Set IGNITION switch to RUN
- Put multimeter - lead on a good ground
- Put multimeter + lead on lead 54 contact of BATTERY switch
- Read multimeter. Multimeter should read +24 volts DC

Does multimeter read +24 volts DC?

GO



TA 118304

Figure 21-1 (Sheet 4 of 7)

GO

YES

NO

9

- Replace BATTERY switch
  - Set BATTERY switch to OFF
  - Set IGNITION switch to OFF
  - Replace BATTERY switch. Refer to TM 9-2320-260-20

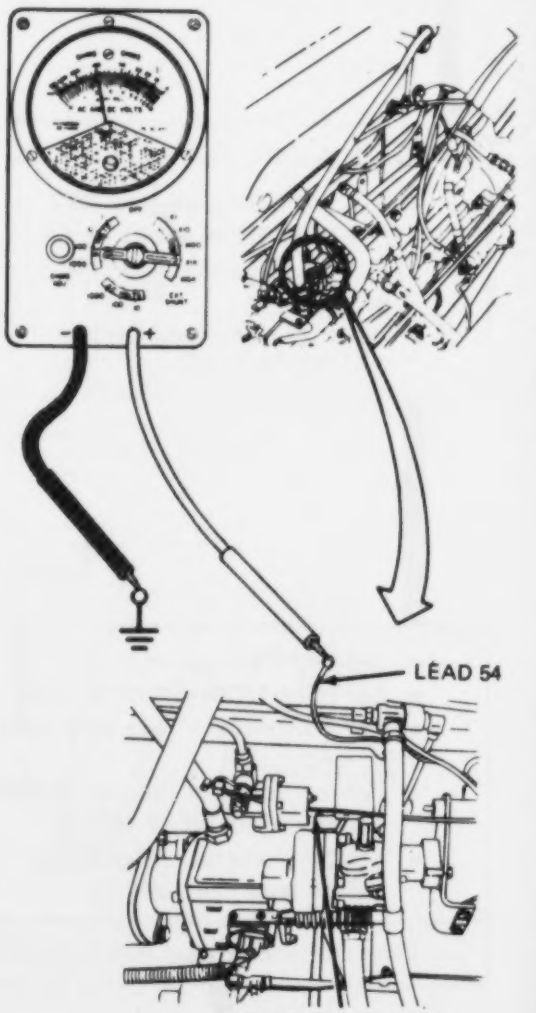
10

- Check that lead 54 from BATTERY switch to electrical fuel shutoff valve assembly is OK
  - Put lead 54 back on BATTERY switch
  - Put BATTERY switch back on instrument panel. Refer to TM 9-2320-260-20
  - Take lead 54 off electrical fuel shutoff assembly contact
  - Set BATTERY switch to ON

- Set IGNITION switch to RUN
- Put multimeter - lead on a good ground
- Put multimeter + lead on lead 54 contact
- Read multimeter. Multimeter should read +24 volts DC

Does multimeter read +24 volts DC?

GO



TA 118305

Figure 21-1 (Sheet 5 of 7)

GO

YES

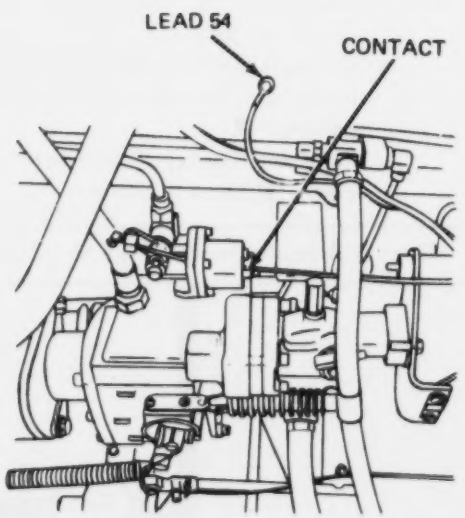
NO

11

- Repair or replace front harness
  - Set BATTERY switch to OFF
  - Set IGNITION switch to OFF
  - Repair or replace front harness. Refer to Vol 2, chapter 7, para 7-9

12

- Clean lead 54 contact and electrical fuel shutoff valve assembly contact
  - Set BATTERY switch to OFF
  - Set IGNITION switch to OFF
  - Clean lead 54 contact and electrical fuel shutoff valve assembly contact.



13

- Try to start engine
  - Put lead 54 back on electrical fuel shutoff valve assembly contact
  - Start engine. Refer to TM 9-2320-260-10

Does engine fail to start?

GO

TA 118306

Figure 21-1 (Sheet 6 of 7)

GO

YES

NO

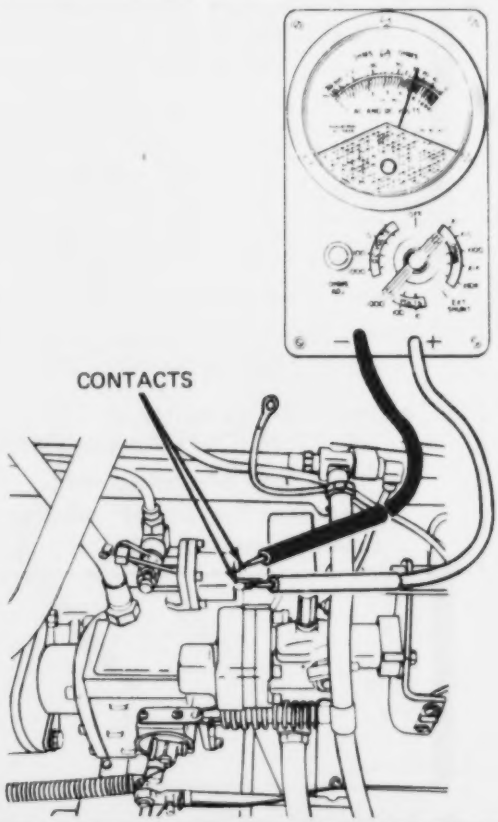
14

- Troubleshooting completed
  - Stop engine. Refer to TM 9-2320-260-10

15

- Check resistance of electrical fuel shutoff valve assembly coil
  - Stop engine. Refer to TM 9-2320-260-10
  - Set multimeter to measure resistance. Refer to TM 9-2320-260-20
  - Put multimeter - lead on one electrical fuel shutoff valve contact
  - Put multimeter + lead on other electrical fuel shutoff valve contact
  - Read multimeter. Multimeter should measure 28 to 32 ohms

Does multimeter measure 28 to 32 ohms?



NO

16

- Replace electrical fuel shutoff valve assembly
  - Refer to TM 9-2320-260-20

YES

17

- Troubleshoot fuel system
  - Do fault isolation procedure for engine does not start. Refer to fault symptom index

TA 118307

Figure 21-1 (Sheet 7 of 7)

Symptom

2 WHEN HYDRAULIC BRAKES ARE APPLIED, TOWED LOAD DOES NOT HAVE ENOUGH BRAKING ACTION

NOTE

Two soldiers are needed for some electrical brake test and are noted as Soldier A and Soldier B

When checking voltage +24 volts DC means a range of +23 to +26 volts DC

1

- Park truck
  - Refer to TM 9-2320-260-10

GO

TA 118330

Figure 21-2 (Sheet 1 of 7)

GO

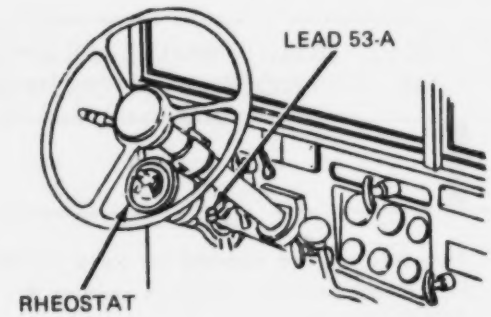
2

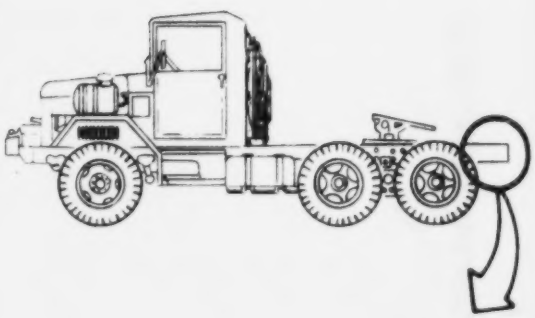
- Check for +24 volts DC to controller assembly
  - Unscrew and take off harness plug from controller assembly receptacle
  - Set rheostat to highest setting
  - Set multimeter to measure +24 volts DC. Refer to TM 9-2320-260-20

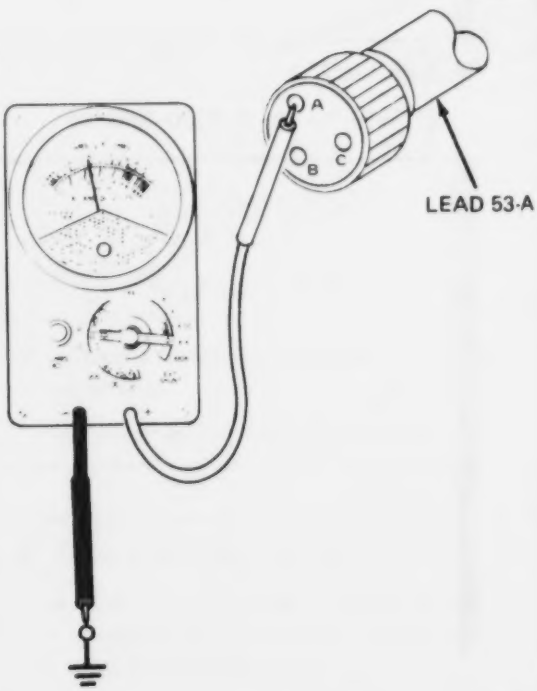
- Put multimeter + lead on lead 53A contact A of harness plug
- Put multimeter - lead on a good ground
- Read multimeter. Multimeter should read +24 volts DC

Does multimeter read +24 volts DC?

GO







TA 118308

Figure 21-2 (Sheet 2 of 7)

GO

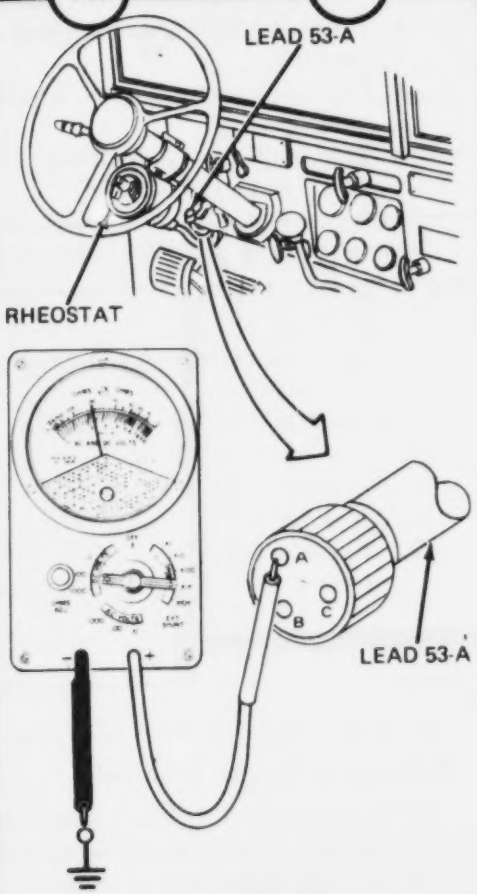
3

- Check for +24 volts DC to lead 53A
  - Take lead 53A off rheostat
  - Put multimeter + lead on rheostat lead 53 contact
  - Put multimeter - lead on a good ground
  - Read multimeter. Multimeter should read +24 volts DC

Does multimeter read less than +24 volts DC?

YES

NO



4

- Go to step 9

5

- Repair or replace lead 53A
  - See figure 22-4

NO

NO GO

TA 118309

Figure 21-2 (Sheet 3 of 7)

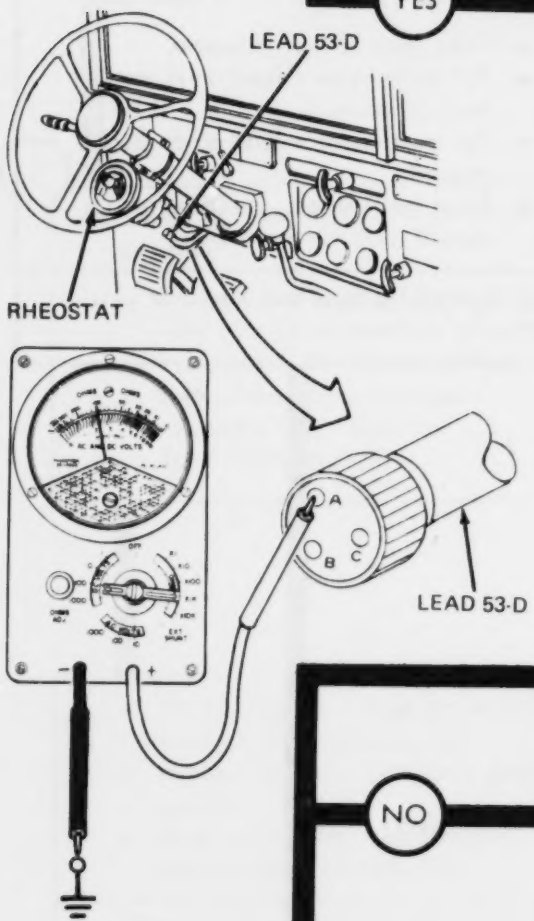
NO GO

YES

6

- Check for +24 volts DC to rheostat
  - Take off lead 53D from rheostat
  - Put multimeter + lead on lead 53D contact
  - Put multimeter – lead on a good ground
  - Read multimeter. Multimeter should read +24 volts DC

Does multimeter read +24 volts DC?



NO

7

- Repair or replace lead 53D
  - Screw on and tighten harness plug to controller assembly receptacle
  - Put lead 53A back on rheostat
  - Repair or replace lead 53D. See figure 22-4

YES

8

- Replace rheostat
  - Screw on and tighten harness plug to controller assembly receptacle
  - Replace rheostat. Refer to TM 9-2320-260-20

TA 118310

Figure 21-2 (Sheet 4 of 7)

From step 4

9

- Check for +24 volts DC through controller assembly

SOLDIER B:
- Put a jumper wire from harness plug contact A to controller assembly receptacle contact A
- Put multimeter + lead on contact B of controller assembly receptacle
- Put multimeter – lead on a good ground

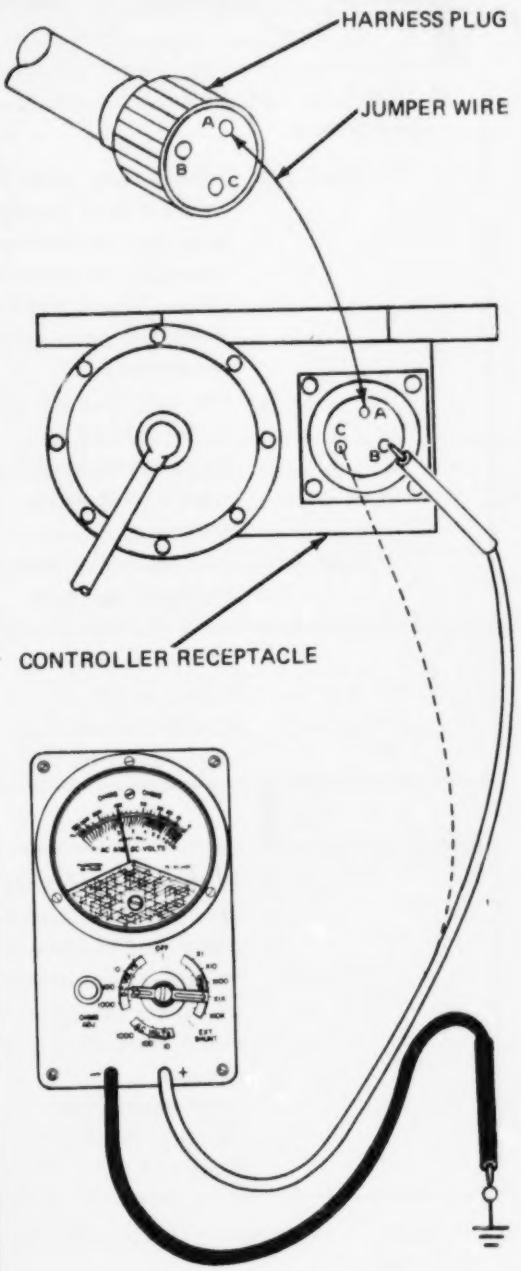
SOLDIER A:
- Step on brake pedal and hold it down

SOLDIER B:
- Read multimeter while Soldier A steps on brake pedal. Multimeter should read +24 volts DC

- With Soldier A still holding down brake pedal put multimeter + lead on contact C of controller assembly receptacle
- Put multimeter – lead on a good ground
- Read multimeter. Multimeter should read +24 volts DC

Does multimeter read +24 volts DC for both tests?

GO



TA 118311

Figure 21-2 (Sheet 5 of 7)

GO

YES

NO

10

- Refer to fault symptom index for brake system

11

- Check for +24 volts DC to trailer receptacle

SOLDIER B:
- Take jumper wire from contact A of harness plug and controller assembly receptacle
- Screw in and tighten harness plug to controller receptacle
- Put multimeter + lead in contact N of trailer receptacle and - lead on a good ground

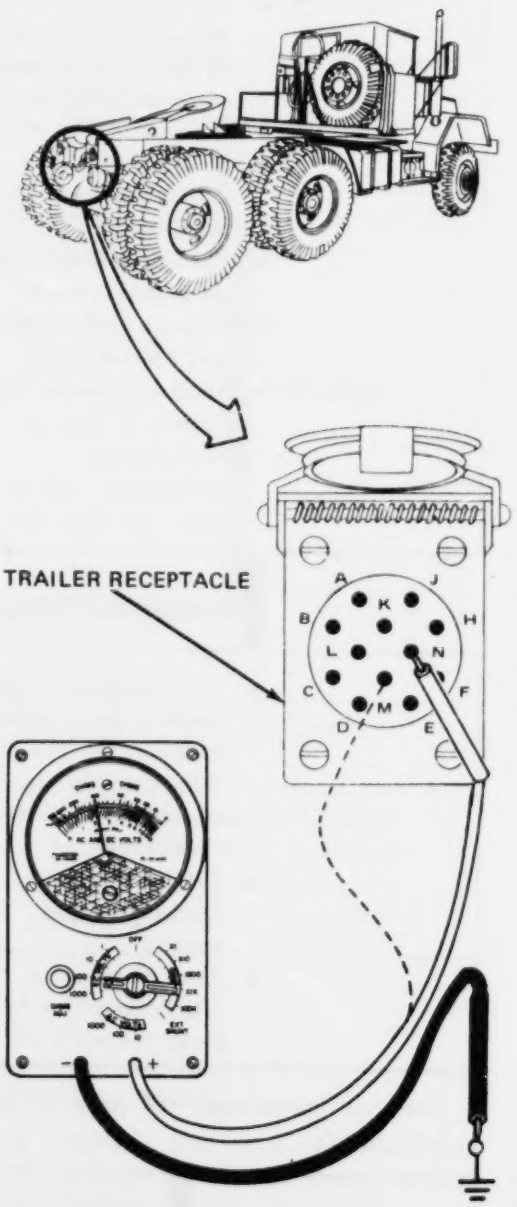
SOLDIER A:
- Step on brake pedal and hold it down

SOLDIER B:
- Read multimeter while Soldier A steps on brake pedal. Multimeter should read +24 volts DC

- With Soldier A still holding down brake pedal put multimeter + lead on contact M of trailer receptacle and - lead on a good ground
- Read multimeter. Multimeter should read +24 volts DC

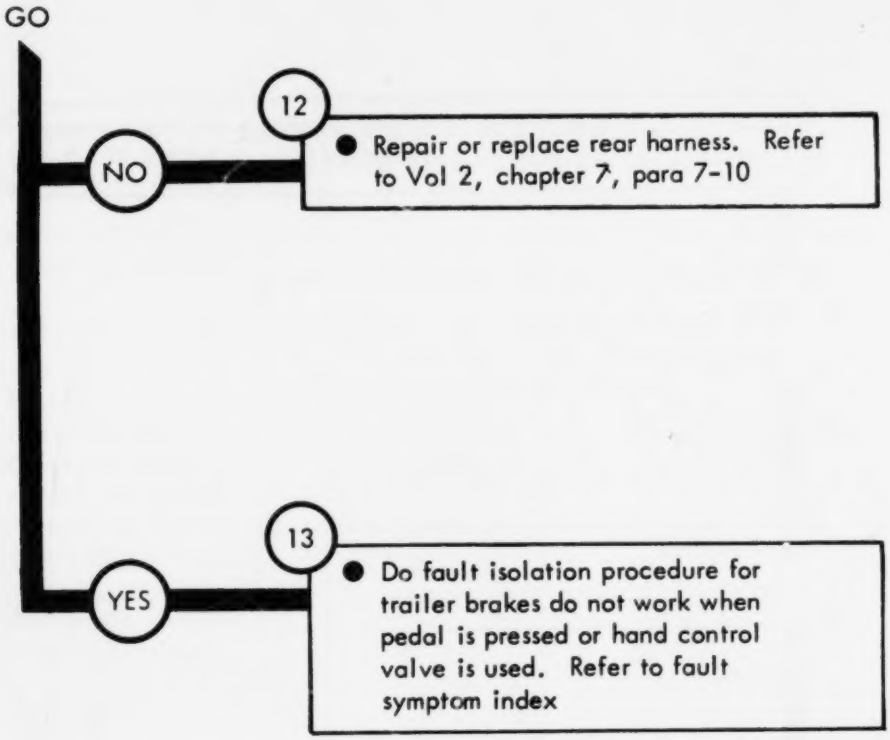
Does multimeter read +24 volts DC for both tests?

GO



TA 118312

Figure 21-2 (Sheet 6 of 7)


GO
12
NO
● Repair or replace rear harness. Refer to Vol 2, chapter 7, para 7-10
13
YES
● Do fault isolation procedure for trailer brakes do not work when pedal is pressed or hand control valve is used. Refer to fault symptom index

TA 118313

Figure 21-2 (Sheet 7 of 7)

Symptom

3 VAN TAILGATE DOES NOT WORK (M820A2 TRUCK), OTHER VAN ELECTRICAL EQUIPMENT WORKS

NOTE

When checking voltage, 120 volts AC means a range of 110 to 125 volts AC

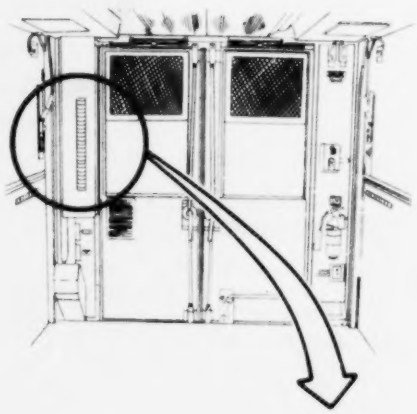
1

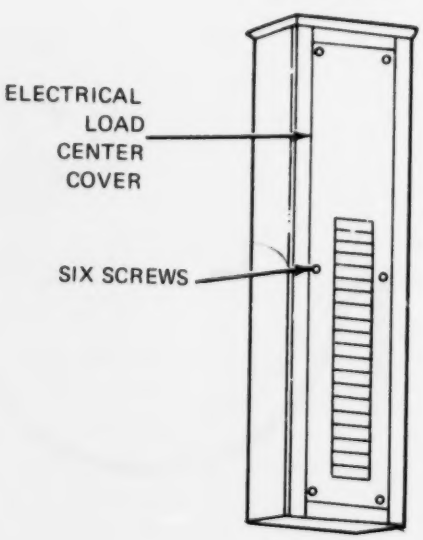
- Park truck
  - Refer to TM 9-2320-260-10

2

- Take off electrical load center cover
  - Using phillips screwdriver, unscrew and take out six screws and take off electrical load center cover

GO





TA 118314

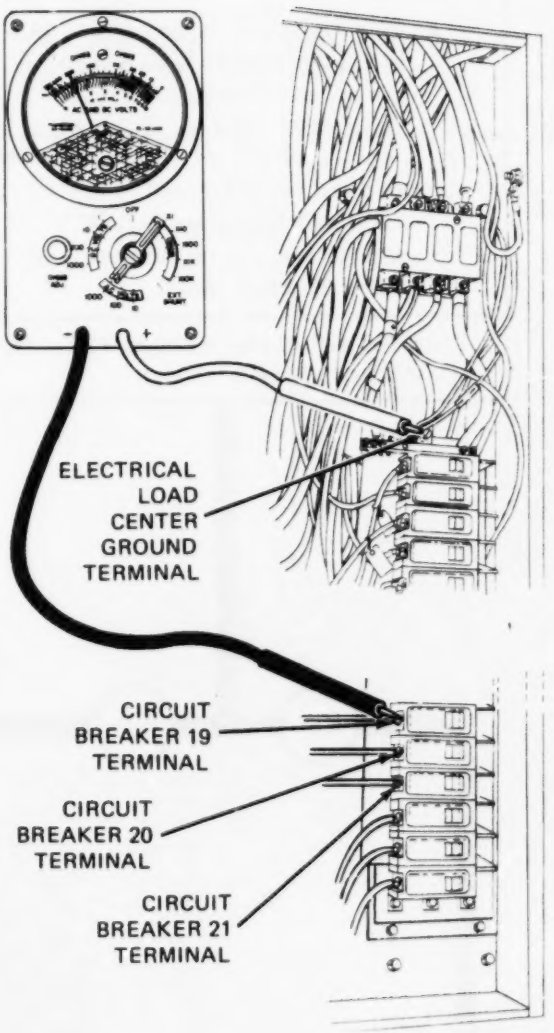
Figure 21-3 (Sheet 1 of 4)

GO

3

- Check for 120 volts AC at output of circuit breakers 19, 20, and 21
  - Make sure that circuit breakers 19, 20, and 21 are set to ON positions
  - Set multimeter to measure 120 volts AC. Refer to TM 9-2320-260-20
  - Put one multimeter lead on electrical load center ground terminal. Put other multimeter lead on circuit breaker 19 terminal, 20 terminal, and circuit breaker 21 terminal. Read multimeter each time. Multimeter should read 120 volts AC each time

Does multimeter read 120 volts AC each time?


ELECTRICAL LOAD CENTER GROUND TERMINAL
CIRCUIT BREAKER 19 TERMINAL
CIRCUIT BREAKER 20 TERMINAL
CIRCUIT BREAKER 21 TERMINAL

GO

TA 118315

Figure 21-3 (Sheet 2 of 4)

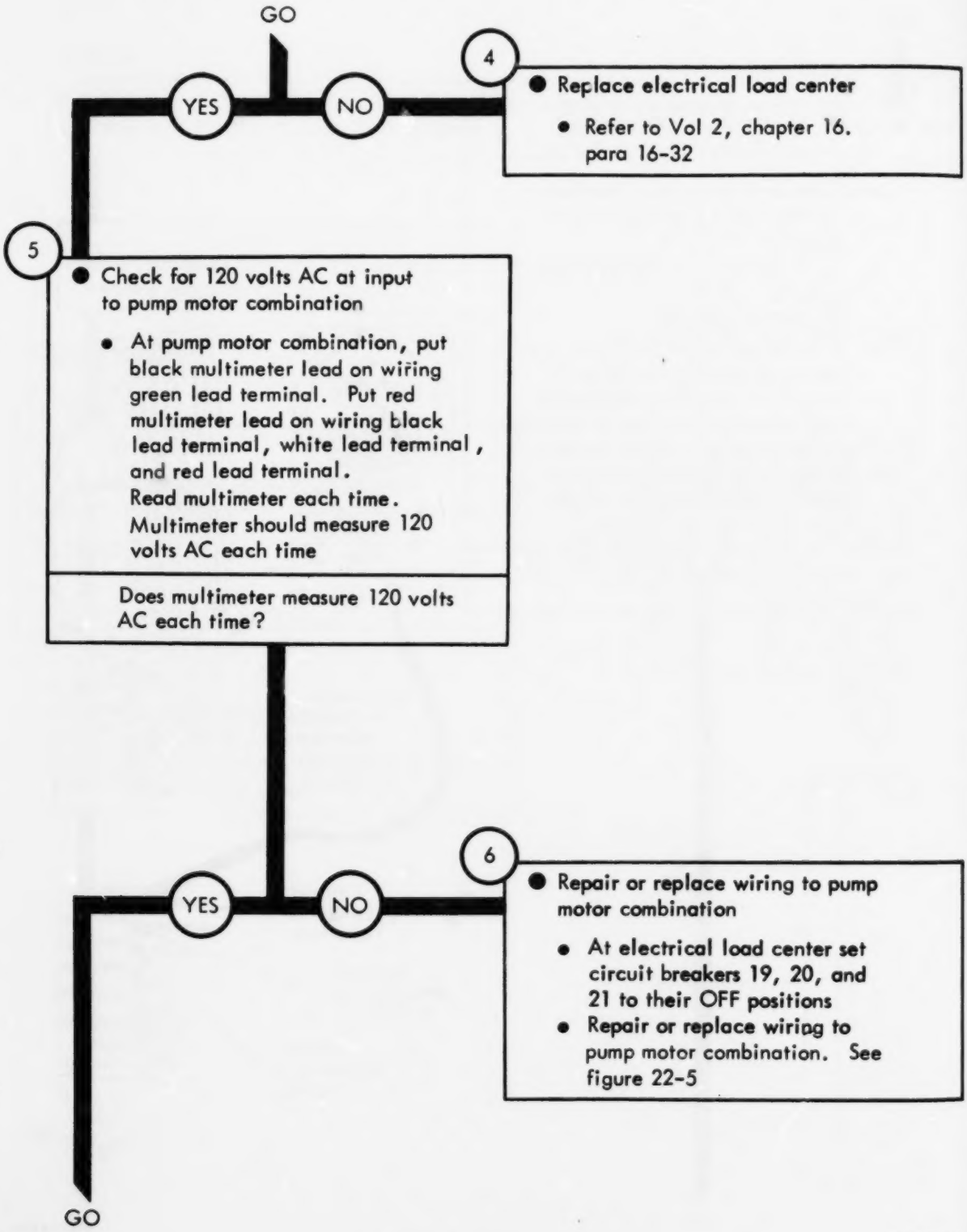

GO
YES
NO
4
● Replace electrical load center
• Refer to Vol 2, chapter 16. para 16-32
5
● Check for 120 volts AC at input to pump motor combination
• At pump motor combination, put black multimeter lead on wiring green lead terminal. Put red multimeter lead on wiring black lead terminal, white lead terminal, and red lead terminal. Read multimeter each time. Multimeter should measure 120 volts AC each time
Does multimeter measure 120 volts AC each time?
YES
NO
6
● Repair or replace wiring to pump motor combination
• At electrical load center set circuit breakers 19, 20, and 21 to their OFF positions
• Repair or replace wiring to pump motor combination. See figure 22-5
GO
TA 118316

Figure 21-3 (Sheet 3 of 4)

GO

7

- Replace pump motor combination
  - At electrical load center set circuit breakers 19, 20, and 21 to their OFF positions
  - Put on electrical load center cover and using phillips screwdriver, screw in and tighten six screws
  - Replace pump motor combination. Refer to Vol 2, chapter 16, para 16-45

TA 118317

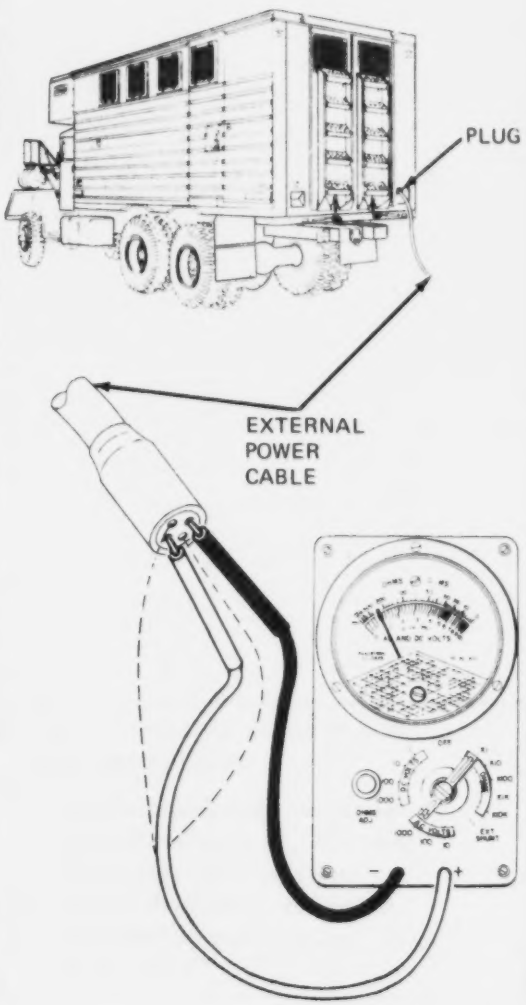
Figure 21-3 (Sheet 4 of 4)

Symptom

4 ALL VAN LIGHTS AND EQUIPMENT DO NOT WORK

WARNING

Only properly trained personnel should perform test on van body 115-volts AC systems. The voltage present in 115 volt AC system can cause severe or fatal electric shock



1

- Park truck
  - Refer to TM 9-2320-260-10

2

- Check for 115 volts AC through external power cable
  - Pull external power cable plug from power entrance receptacle
  - Set multimeter to measure 115 volts AC. Refer to TM 9-2320-260-20
  - Put multimeter - lead on large contact of power cable plug
  - Put multimeter + lead on each of the small contacts of power cable plug
  - Read multimeter for each contact tested. Multimeter should read 115-volts AC

Does multimeter read less than 115 volts AC for each contact tested?

GO

TA 118318

Figure 21-4 (Sheet 1 of 2)

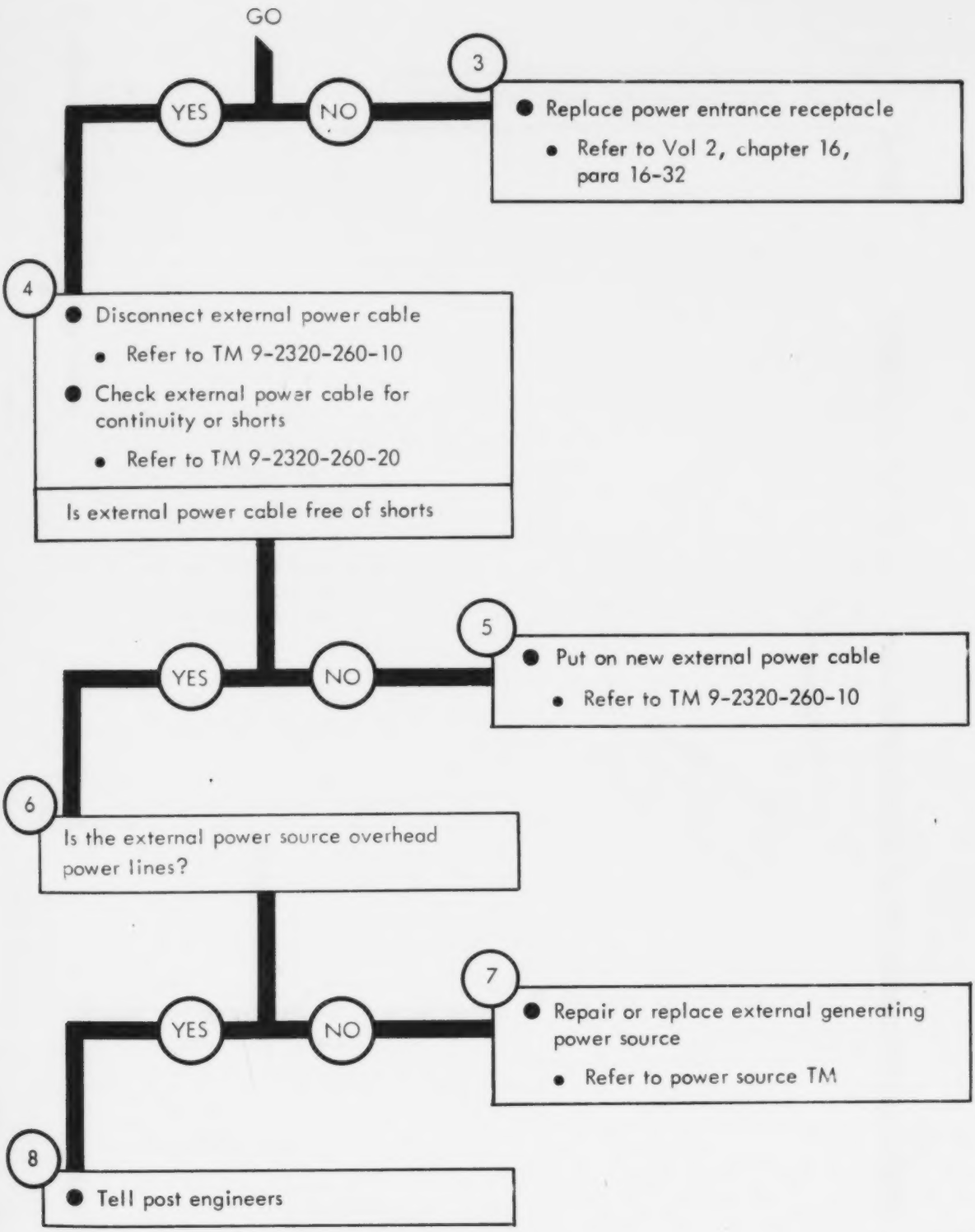


Figure 21-4 (Sheet 2 of 2)

Figure 21-5 (Sheet 1 of 8)

TA 118320

GO

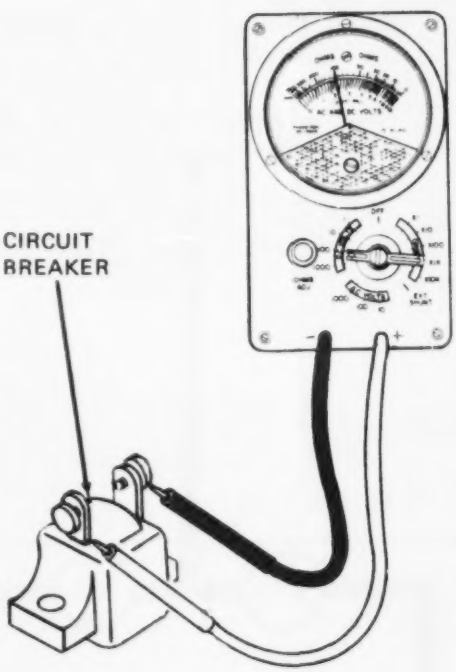
NOTE

See figure 22-8 for coolant heater wiring diagram when doing these procedures

2

- Check for +24 volts DC through control box circuit breaker
  - Take cover off control box. Refer to TM 9-2320-260-20
  - Set multimeter to measure +24 volts DC. Refer to TM 9-2320-260-20
  - Put multimeter + lead on other contact of circuit breaker
  - Read multimeter. Multimeter should read +24 volts DC

Does multimeter read +24 volts DC?



YES

NO

3

- Replace circuit breaker
  - Refer to TM 9-2320-260-20

GO

TA 118321

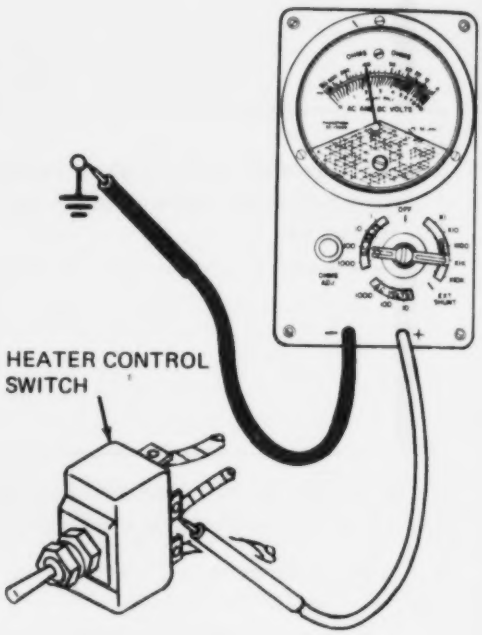
Figure 21-5 (Sheet 2 of 8)

GO

4

- Check for +24 volts DC to control switch
  - Put multimeter + lead on lead from circuit breaker at heater control switch
  - Put multimeter - lead on a good ground
  - Read multimeter. Multimeter should read +24 volts DC

Does multimeter read +24 volts DC?



YES

NO

5

- Repair or replace lead from circuit breaker to heater control switch
  - See figure 22-8

GO

TA 118322

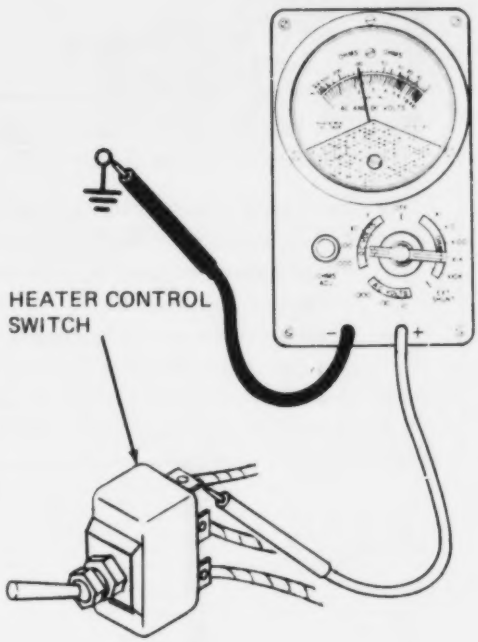
Figure 21-5 (Sheet 3 of 8)

GO

6

- Check for +24 volts DC through heater control switch when set to start
  - Put multimeter - lead on contact 14 of heater control switch and + lead on contact 21
  - Place heater control switch to start and hold it there
  - Read multimeter while switch is held at start
  - Multimeter should read +24 volts DC

Does multimeter read +24 volts DC?



YES

NO

7

- Replace heater control switch
  - Refer to TM 9-2320-260-20

GO

TA 118323

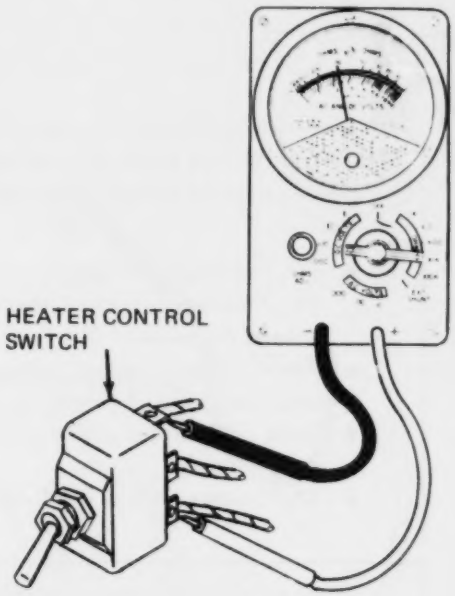
Figure 21-5 (Sheet 4 of 8)

GO

8

- Check for +24 volts through heater control switch when set to RUN
  - Set heater control switch to RUN
  - Put multimeter - lead on contact 16 of heater control switch and + lead on contact 19
  - Read multimeter. Multimeter should read +24 volts DC

Does multimeter read +24 volts DC?



YES

NO

9

- Replace heater control switch
  - Refer to TM 9-2320-260-20

GO

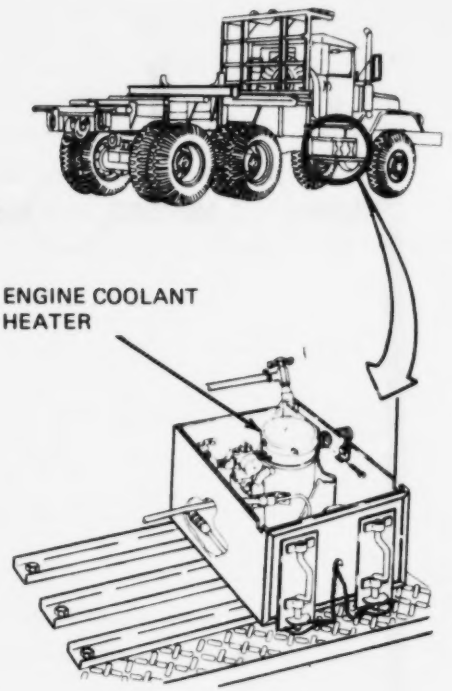
TA 118324

Figure 21-5 (Sheet 5 of 8)

GO

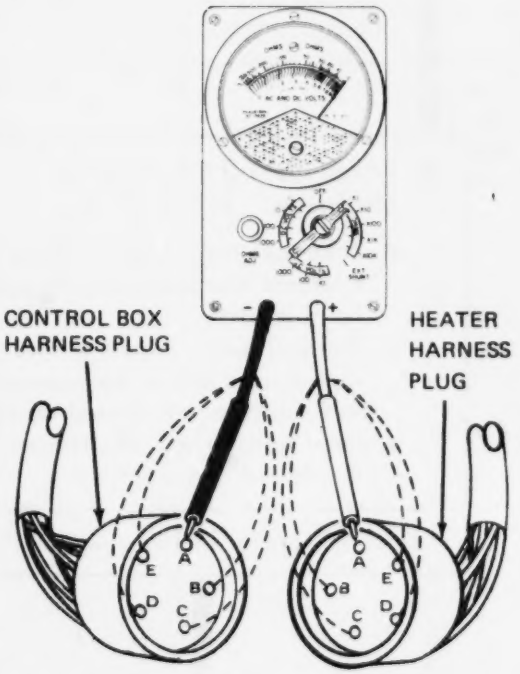
10

- Check harness from heater control box to heater for continuity
  - Set heater control switch to OFF
  - Unscrew and take off harness plug from control box receptacle
  - Unscrew and take off harness plug from heater
  - Set multimeter to measure continuity. Refer to TM 9-2320-260-20



- Place multimeter - lead on control box harness plug contact A
- Place multimeter + lead on heater harness plug contact A
- Read multimeter. Multimeter should indicate continuity
- Do this test for contacts B, C, D, and E of both harness plugs
- Read multimeter after each contact tested. Multimeter should indicate continuity for each test

Does multimeter indicate continuity for each contact tested?



GO

TA 118325

Figure 21-5 (Sheet 6 of 8)

GO

YES

NO

11

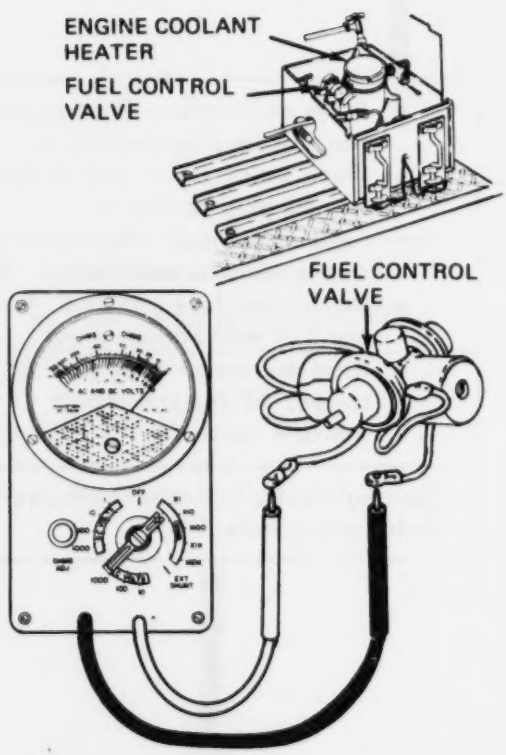
- Repair or replace harness from heater control box to heater
  - Refer to Vol 2, chapter 7, para 7-15

12

- Check fuel control valve for continuity
  - Take fuel control valve leads off overheat thermostat switch and terminal strip
  - Put multimeter - lead on one fuel control valve lead contact and + lead on other lead contact
  - Read multimeter. Multimeter should indicate continuity

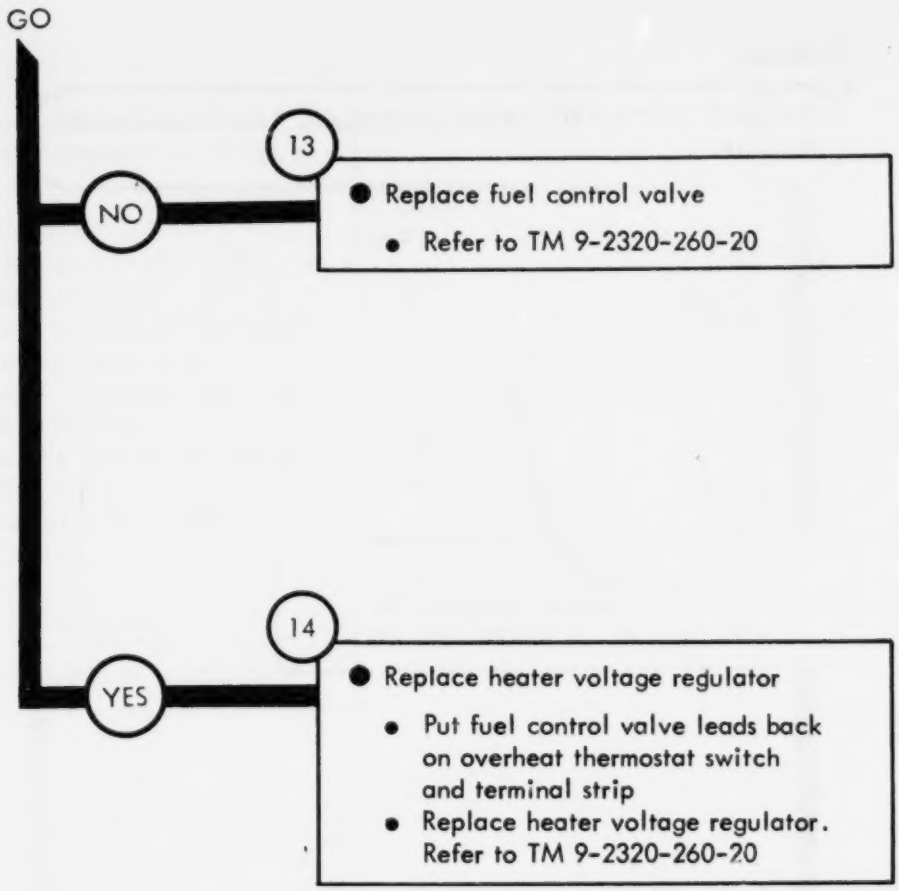
Does multimeter indicate continuity?

GO



TA 118326

Figure 21-5 (Sheet 7 of 8)


GO
NO
13
● Replace fuel control valve
• Refer to TM 9-2320-260-20
YES
14
● Replace heater voltage regulator
• Put fuel control valve leads back on overheat thermostat switch and terminal strip
• Replace heater voltage regulator. Refer to TM 9-2320-260-20

TA 118327

Figure 21-5 (Sheet 8 of 8)

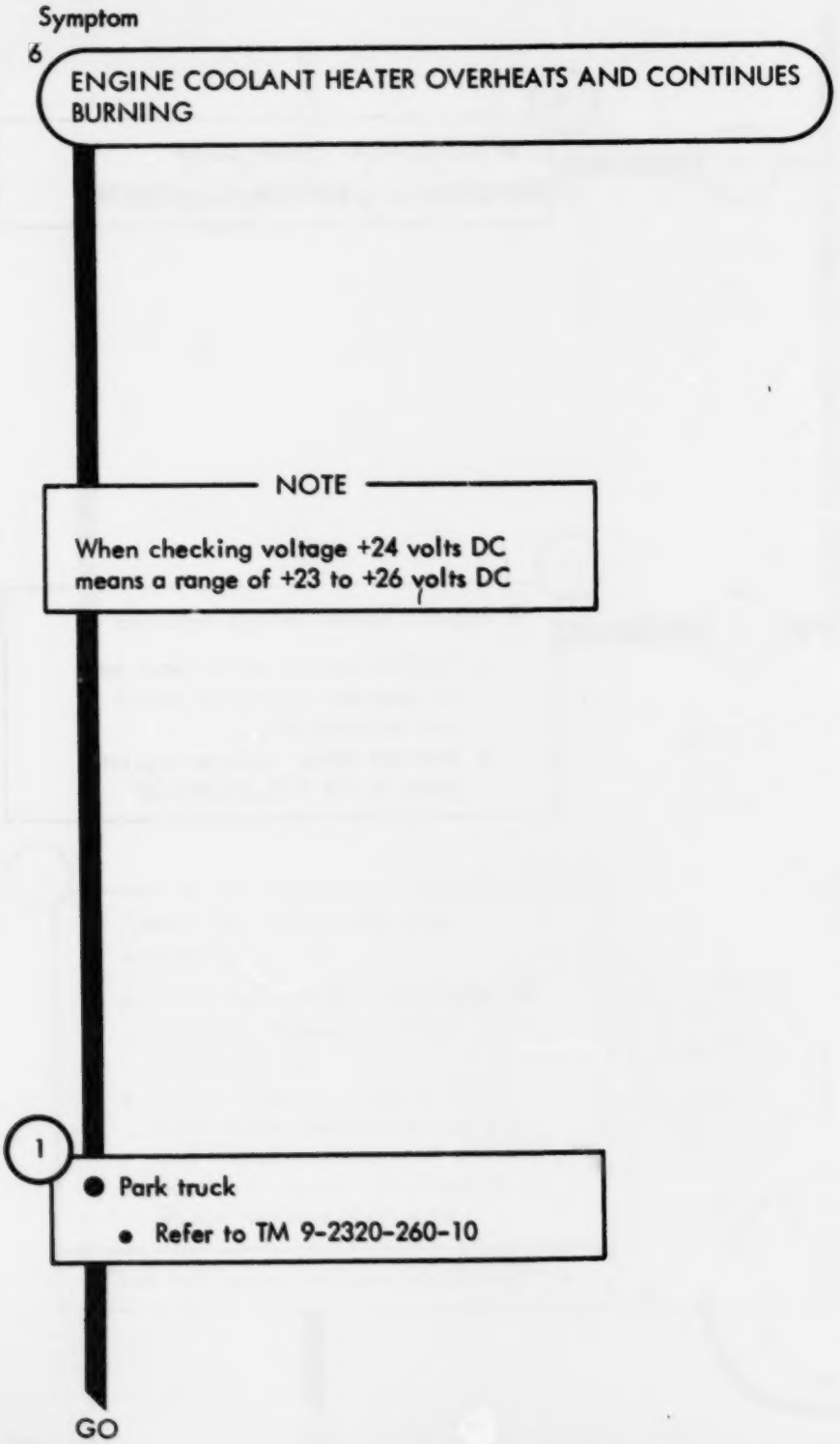


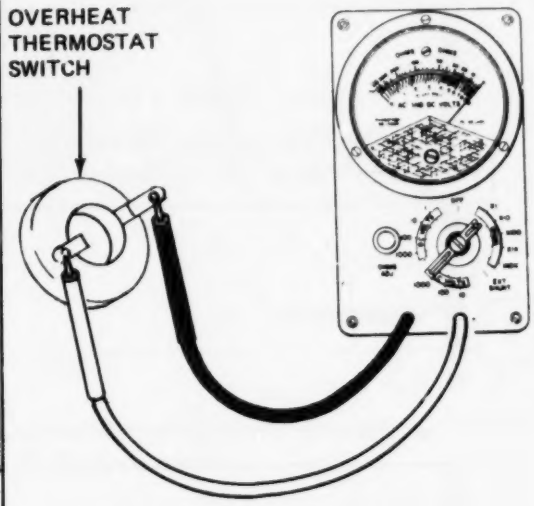
Figure 21-6 (Sheet 1 of 2)

GO

2

- Check overheat thermostat switch for continuity
  - Start heater and run until it overheats then shut it off. Refer to TM 9-2320-260-10
  - Take off leads on overheat thermostat switch. Refer to para 19-6
  - Set multimeter to measure continuity Refer to TM 9-2320-260-20
  - Put multimeter - lead on contact of overheat thermostat switch and + lead on other end of overheat thermostat switch
  - Read multimeter. Multimeter should not indicate continuity

Does multimeter indicate continuity?



NO

3

- Replace fuel control valve
  - Put back overheat thermostat switch
  - Replace fuel control valve. Refer to TM 9-2320-260-20

YES

4

- Replace overheat thermostat switch
  - Refer to TM 9-2320-260-20

TA 118329

Figure 21-6 (Sheet 2 of 2)

Symptom

7 ENGINE COOLANT HEATER DOES NOT GIVE ENOUGH HEAT

NOTE

When checking voltage +24 volts DC means a range of +23 to +26 volts DC

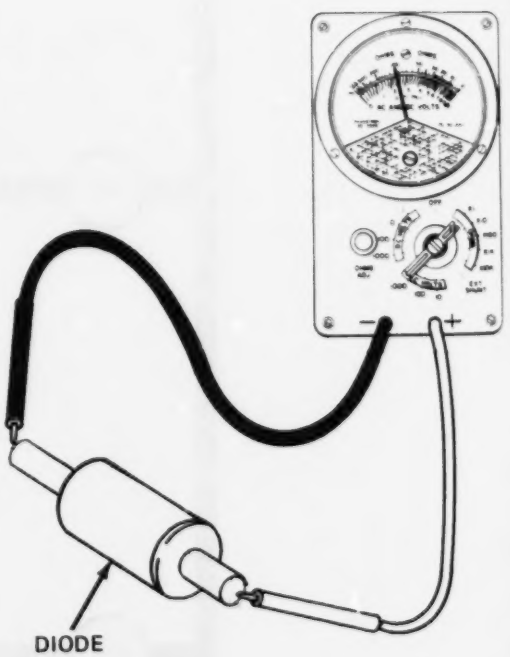
1

- Park truck
  - Refer to TM 9-2320-260-10

2

- Check diode for resistance
  - Remove diode from holder. Refer to TM 9-2320-260-20
  - Set multimeter to measure resistance. Refer to TM 9-2320-260-20
  - Put multimeter - lead on one end of diode
  - Put multimeter + lead on other end of diode
  - Read multimeter

GO



TA 118331

Figure 21-7 (Sheet 1 of 5)

GO

- Place multimeter - lead where + lead was and + lead where - lead was in last test
- Read multimeter. Multimeter should have indicated resistance in one test and no resistance in the other test

Did both resistance test check out OK?

YES — NO

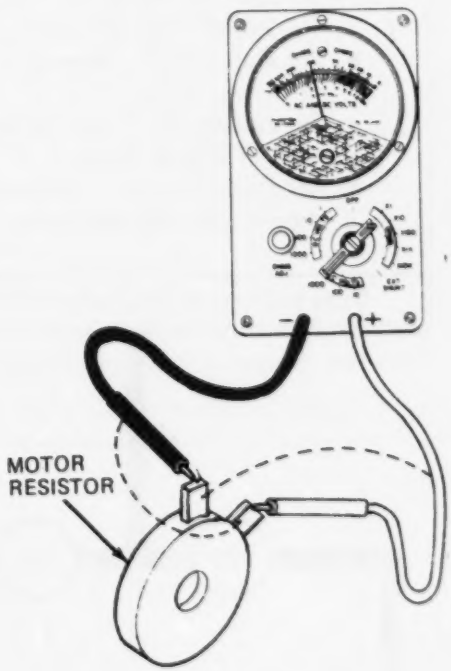
3

- Replace diode
  - Refer to TM 9-2320-260-20

4

- Check resistance of motor resistor
  - Pull leads off both contact of motor resistor. See figure 22-8
  - Put multimeter - lead on one contact of resistor and + lead on other contact of resistor
  - Read multimeter. Multimeter should indicate resistance
  - Put multimeter - lead on contact where multimeter + lead was and + lead where - lead was for last test
  - Read multimeter. Multimeter should indicate resistance

Did multimeter indicate resistance for both tests?



GO

TA 118332

Figure 21-7 (Sheet 2 of 5)

GO

YES

NO

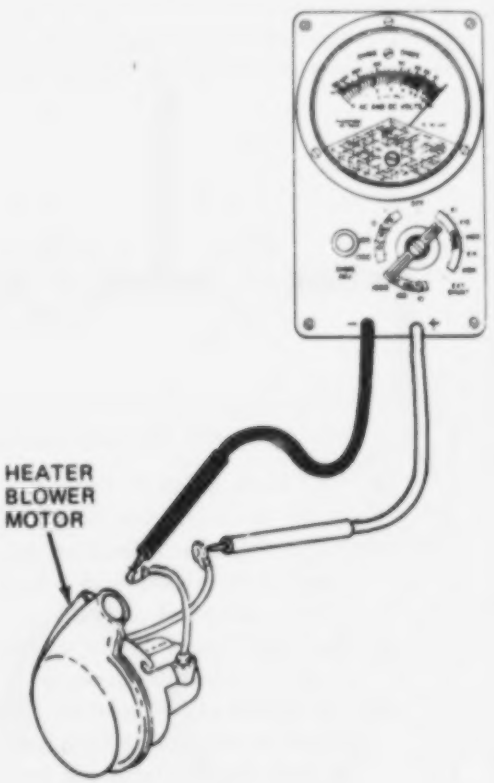
5

- Replace motor resistor
  - Refer to TM 9-2320-260-20

6

- Check heater blower motor for continuity
  - Disconnect heater blower motor leads. Refer to TM 9-2320-260-20
  - Set multimeter to measure continuity. Refer to TM 9-2320-260-20
  - Put multimeter - lead on one lead of blower motor
  - Put multimeter + lead on other lead of blower motor
  - Read multimeter. Multimeter should indicate continuity

Does multimeter indicate continuity?



YES

NO

7

- Replace heater blower motor
  - Refer to TM 9-2320-260-20

GO

TA 116333

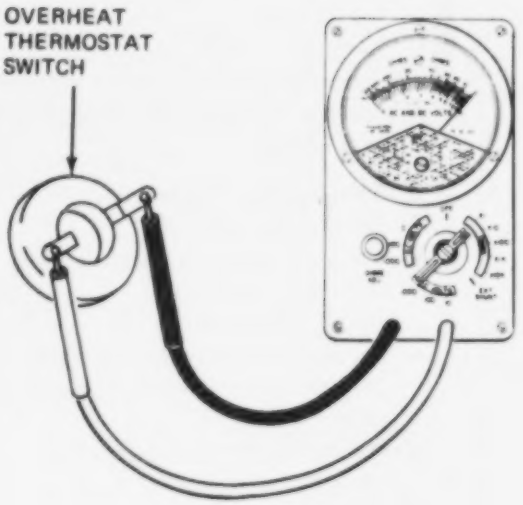
Figure 21-7 (Sheet 3 of 5)

GO

8

- Check overheat thermostat switch for continuity
  - Take out overheat thermostat switch. Refer to TM 9-2320-260-20
  - Set multimeter to measure continuity. Refer to TM 9-2320-260-20
  - Put multimeter – lead on contact of overheat switch and + lead on other end of overheat thermostat switch
  - Read multimeter. Multimeter should indicate continuity

Does multimeter indicate continuity?



YES

NO

9

- Replace overheat thermostat switch
  - Refer to TM 9-2320-260-20

GO

TA 118334

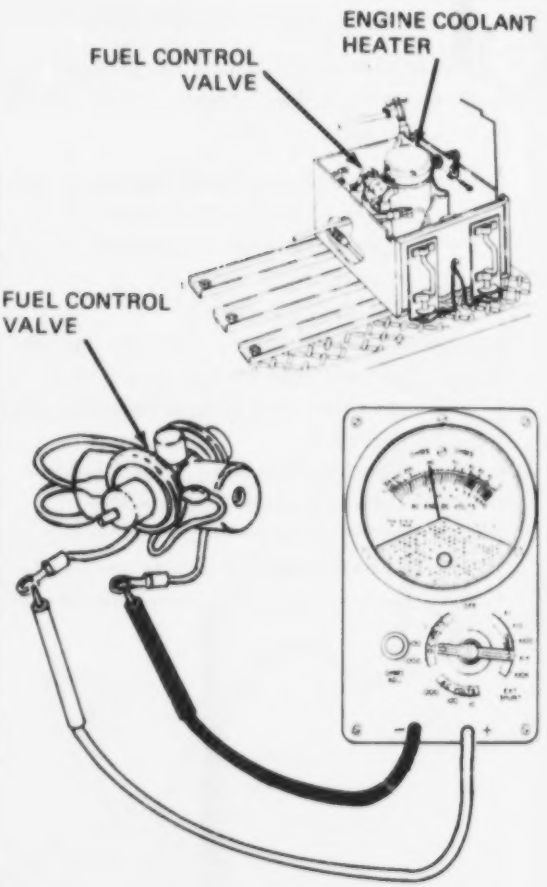
Figure 21-7 (Sheet 4 of 5)

GO

10

- Check for +24 volts DC through fuel control valve
  - Start heater. Refer to TM 9-2320-260-10
  - Set multimeter to measure +24 volts DC. Refer to TM 9-2320-260-20
  - Put multimeter - lead on fuel control valve lead at terminal strip
  - Put multimeter + lead on fuel control valve lead at overheat thermostat switch
  - Read multimeter. Multimeter should read +24 volts DC

Does multimeter read +24 volts DC?



NO

11

- Replace fuel control valve
  - Refer to TM 9-2320-260-20

YES

12

- Replace overheat thermostat heat switch
  - Refer to TM 9-2320-260-20

TA 118335

Figure 21-7 (Sheet 5 of 5)

Symptom 8

PERSONNEL FUEL BURNING HEATER DOES NOT START

NOTE

When checking voltage +24 volts DC means a range of +23 to +26 volts DC

1

- Park truck
  - Refer to TM 9-2320-260-10

NOTE

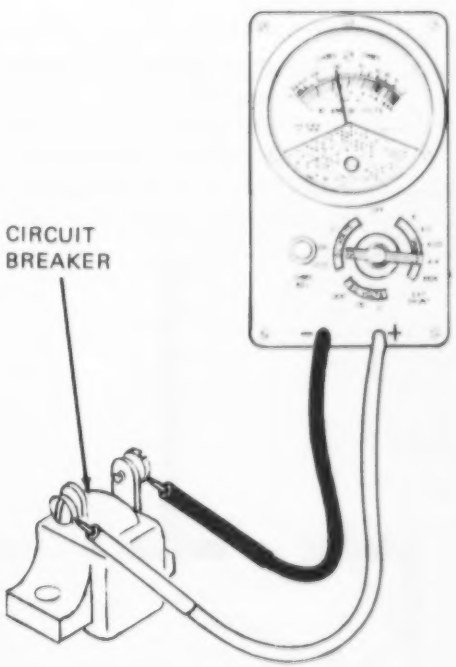
See figure 22-9 personnel fuel burning heater wiring diagram when doing these procedures

2

- Check for +24 volts DC through control box circuit breaker
  - Take cover off control box. Refer to TM 9-2320-260-20
  - Set multimeter to measure +24 volts DC. Refer to test equipment procedures index
  - Put multimeter - lead on one contact of circuit breaker
  - Put multimeter + lead on other contact of circuit breaker
  - Read multimeter. Multimeter should measure +24 volts DC

Does multimeter measure +24 volts DC?

GO



TA 118336

Figure 21-8 (Sheet 1 of 5)

GO

YES

NO

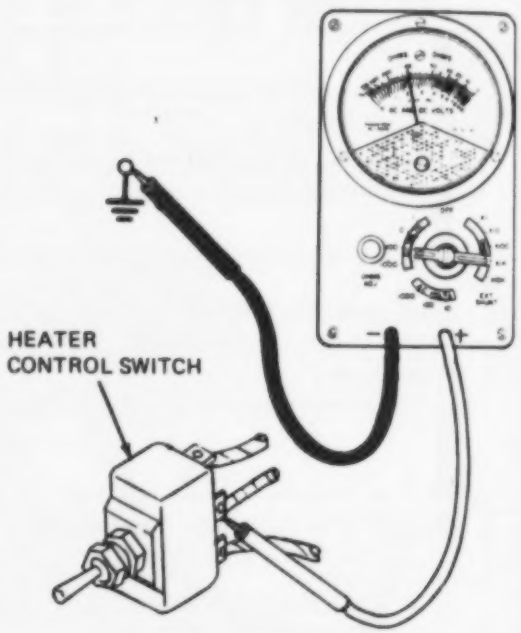
3

- Replace circuit breaker
  - See figure 22-9

4

- Check for +24 volts DC to control switch
  - Put multimeter - lead on a good ground
  - Put multimeter + lead on lead from circuit breaker at heater control switch
  - Read multimeter. Multimeter should measure +24 volts DC

Does multimeter measure +24 volts DC?



YES

NO

5

- Repair or replace lead from circuit breaker to heater control switch
  - See figure 22-9

GO

TA 118337

Figure 21-8 (Sheet 2 of 5)

GO

6

- Check for +24 volts DC through heater control switch when set to start
  - Put multimeter - lead on contact 14 of heater control switch
  - Put multimeter + lead on contact 21
  - Place heater control switch to START and hold it there
  - Read multimeter while switch is held at START
  - Multimeter should measure +24 volts DC

Does multimeter measure +24 volts DC?

YES

NO

7

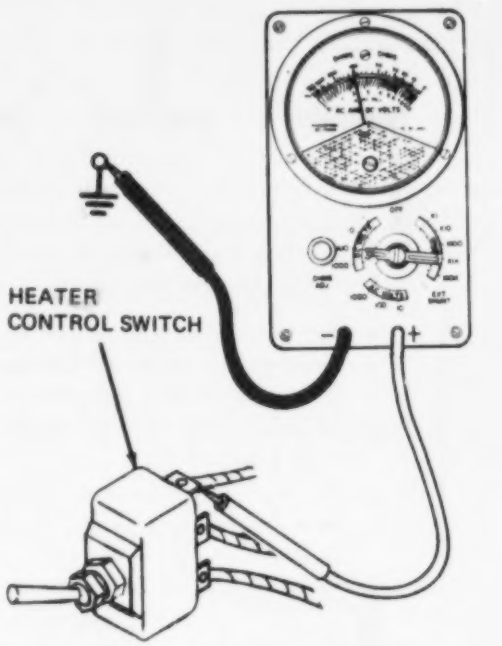
- Replace heater control switch
  - See figure 22-9

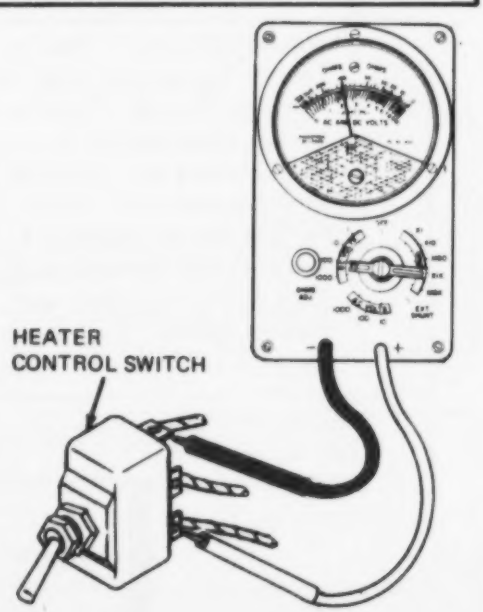
8

- Check for +24 volts through heater control switch when set to RUN
  - Set heater\control switch to RUN
  - Put multimeter - lead on contact 16 of heater control switch and + lead on contact 19
  - Read multimeter. Multimeter should measure +24 volts DC

Does multimeter measure +24 volts DC?

GO





TA 116338

Figure 21-8 (Sheet 3 of 5)

GO

YES

NO

9

- Replace heater control switch
  - See figure 22-9

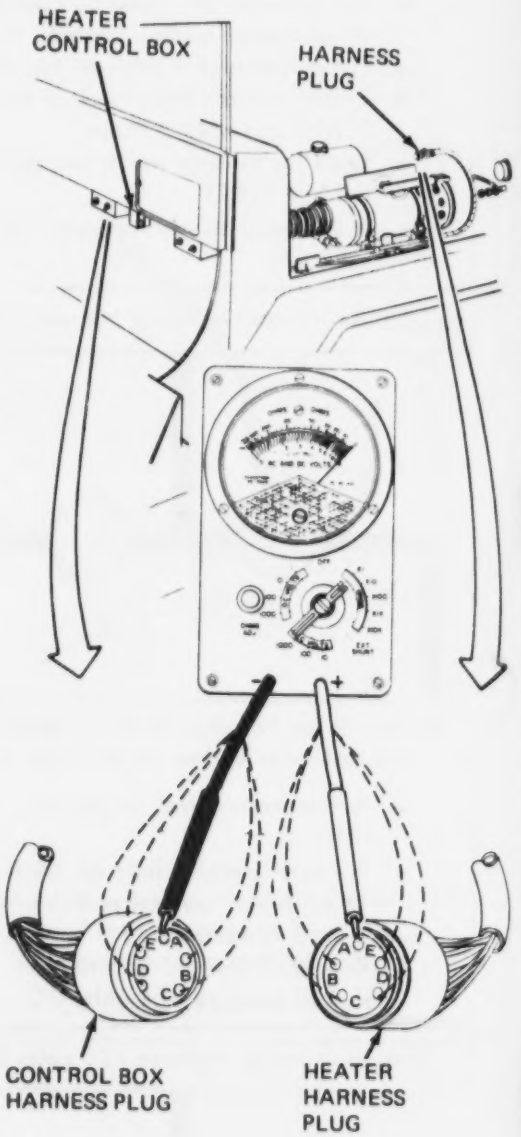
10

- Check harness from heater control box to heater for continuity
  - Set heater control switch to OFF
  - Unscrew and take off harness plug from control box receptacle
  - Unscrew and take off harness plug from heater
  - Set multimeter to measure continuity Refer to test equipment procedures index

- Place multimeter - lead on control box harness plug contact A
- Place multimeter + lead on heater harness plug contact A
- Read multimeter. Multimeter should measure continuity
- Do this test for contacts B, C, D, and E of both harness plugs
- Read multimeter after each contact tested. Multimeter should measure zero ohms for each test

Does multimeter measure zero ohms for each contact tested?

GO



TA 118339

Figure 21-8 (Sheet 4 of 5)

GO

YES

NO

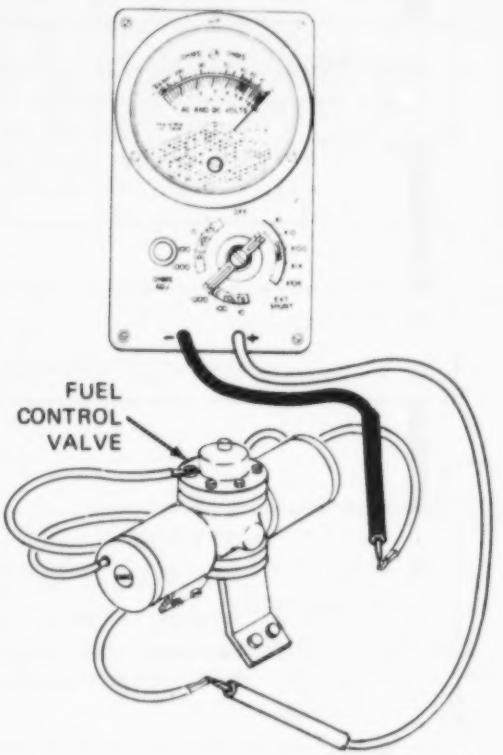
11

- Repair or replace harness from heater control box to heater
  - See figure 22-9

12

- Check fuel control valve for continuity
  - Take fuel control valve leads off overheat thermostat switch and terminal strip. Refer to TM 9-2320-260-20
  - Put multimeter – lead on one fuel control valve lead contact and + lead on other lead contact
  - Read multimeter. Multimeter should measure zero ohms

Does multimeter measure zero ohms?



NO

13

- Replace fuel control valve
  - Refer to TM 9-2320-260-20

YES

14

- Replace heater voltage regulator
  - Put fuel control valve leads back on overheat thermostat switch and terminal strip
  - Replace heater voltage regulator. Refer to TM 9-2320-260-20

TA 118340

Figure 21-8 (Sheet 5 of 5)

Symptom 9

PERSONNEL FUEL BURNING HEATER OVERHEATS AND CONTINUES BURNING

NOTE

When checking voltage +24 volts DC means a range of +23 to +26 volts DC

1

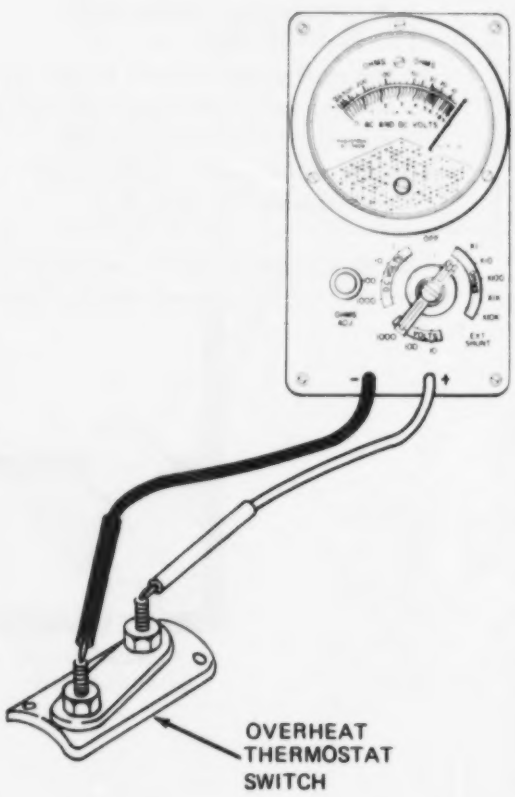
- Park truck
  - Refer to TM 9-2320-260-10

2

- Check overheat thermostat switch for continuity
  - Take out overhead thermostat switch. Refer to TM 9-2320-260-20
  - Set multimeter to measure continuity. Refer to TM 9-2320-260-20
  - Put multimeter - lead on contact of overheat switch and + lead on other end of overheat thermostat switch
  - Read multimeter. Multimeter should indicate continuity

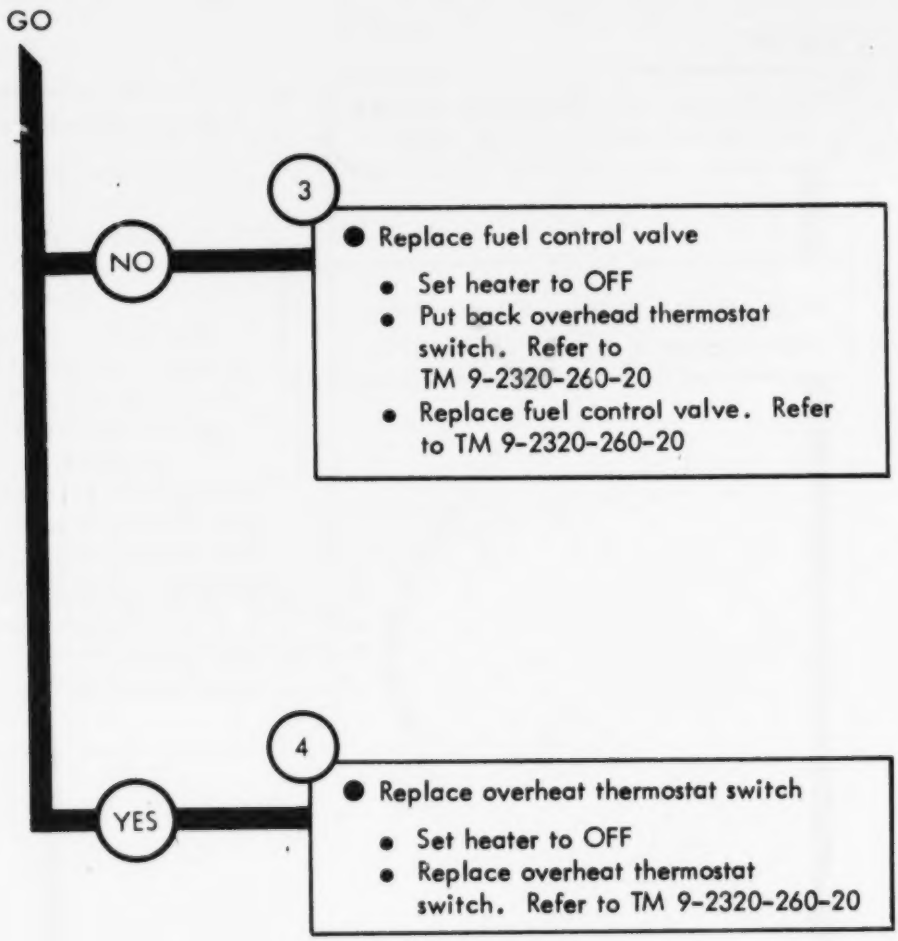
Does multimeter indicate continuity?

GO



TA 118341

Figure 21-9 (Sheet 1 of 2)


GO
NO
3
● Replace fuel control valve
• Set heater to OFF
• Put back overhead thermostat switch. Refer to TM 9-2320-260-20
• Replace fuel control valve. Refer to TM 9-2320-260-20
YES
4
● Replace overheat thermostat switch
• Set heater to OFF
• Replace overheat thermostat switch. Refer to TM 9-2320-260-20

TA 118342

Figure 21-9 (Sheet 2 of 2)

TA 118343

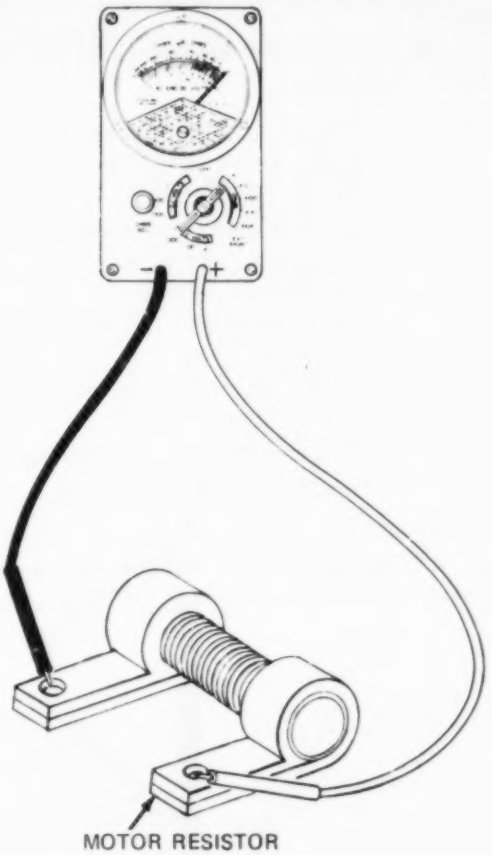
Figure 21-10 (Sheet 1 of 5)

GO

2

- Check resistance of motor resistor
  - Pull leads off both contacts of motor resistor
  - Set multimeter to measure resistance. Refer to TM 9-2320-260-20
  - Put multimeter - lead on one contact of resistor and + lead on other contact or resistor
  - Read multimeter. Multimeter should indicate resistance
  - Put multimeter - lead on contact where multimeter + lead was and + lead where - lead was for last test. Read multimeter. Multimeter should indicate resistance

Did multimeter indicate resistance for both tests?



YES

NO

3

- Replace heater resistor
  - Refer to TM 9-2320-260-20

GO

TA 118344

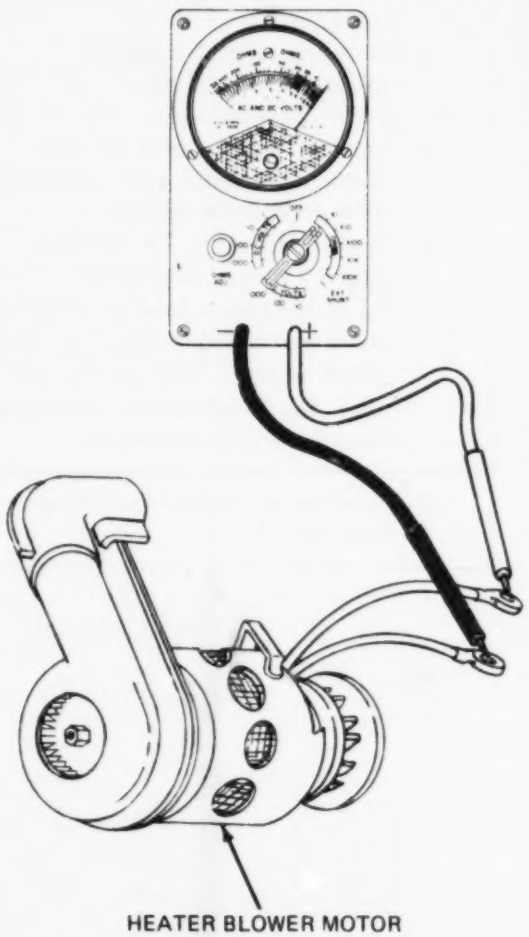
Figure 21-10 (Sheet 2 of 5)

GO

4

- Check heater blower motor for continuity
  - Disconnect heater blower motor leads. Refer to TM 9-2320-260-20
  - Set multimeter to measure continuity. Refer to TM 9-2320-260-20
  - Put multimeter - lead on lead of blower motor
  - Put multimeter + lead on other lead of blower motor
  - Read multimeter. Multimeter should indicate continuity

Does multimeter indicate continuity?



YES

NO

5

- Replace heater blower motor
  - Refer to TM 9-2320-260-20

GO

TA 118345

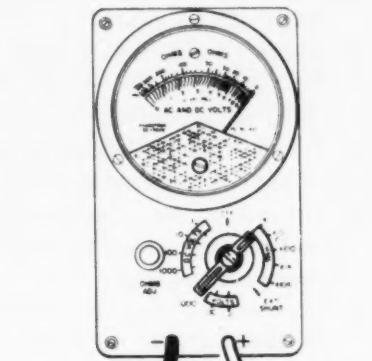
Figure 21-10 (Sheet 3 of 5)

GO

6

- Check overheat thermostat switch for continuity
  - Put heater back together. Refer to Vol 2, chapter 19, para 19-8
  - Take out overheat thermostat switch. Refer to TM 9-2320-260-20
  - Put multimeter - lead on contact of switch and + lead on other end of switch
  - Read multimeter. Multimeter should indicate continuity

Does multimeter indicate continuity?



OVERHEAT THERMOSTAT SWITCH

YES

NO

7

- Replace overheat thermostat switch
  - Refer to TM 9-2320-260-20

GO

TA 118346

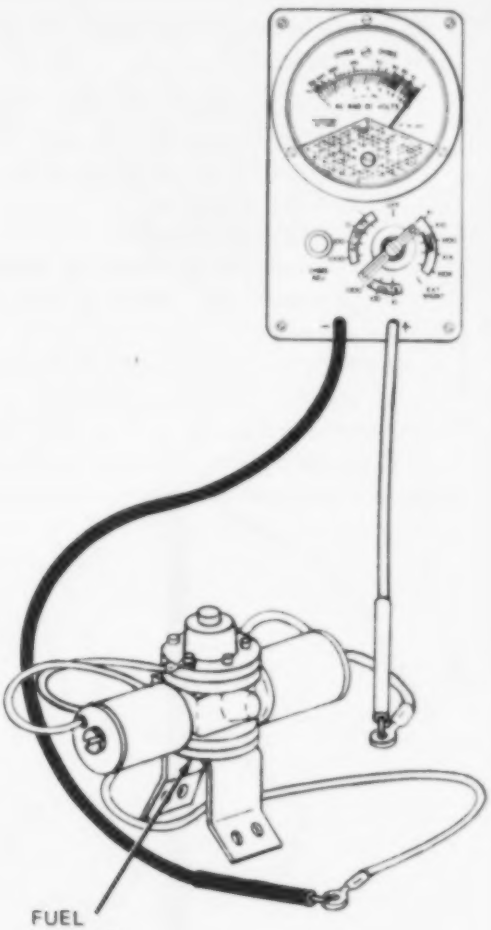
Figure 21-10 (Sheet 4 of 5)

GO

8

- Check for +24 volts DC through fuel control valve
  - Start heater. Refer to TM 9-2320-260-10
  - Set multimeter to measure +24 volts DC. Refer to TM 9-2320-260-20
  - Put multimeter – lead on fuel control valve lead at terminal strip
  - Put multimeter + lead on fuel control valve lead at overheat thermostat switch
  - Read multimeter. Multimeter should read +24 volts DC

Does multimeter read +24 volts DC?



NO

9

- Replace fuel control valve
  - Refer to Vol 2, chapter 7, para 7-5

10

- Replace heater switch
  - Refer to TM 9-2320-260-20

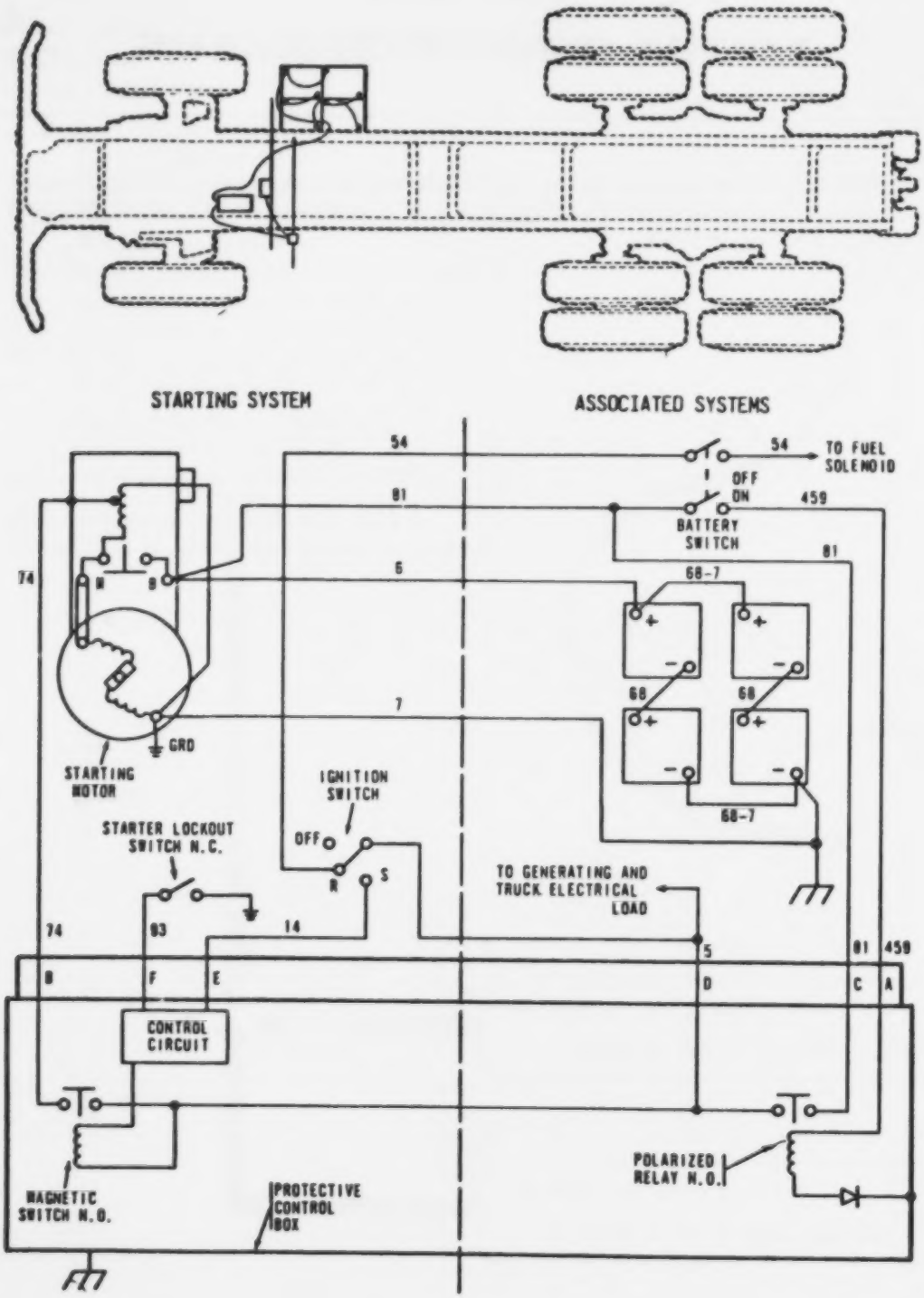
TA 118347

Figure 21-10 (Sheet 5 of 5)

CHAPTER 22

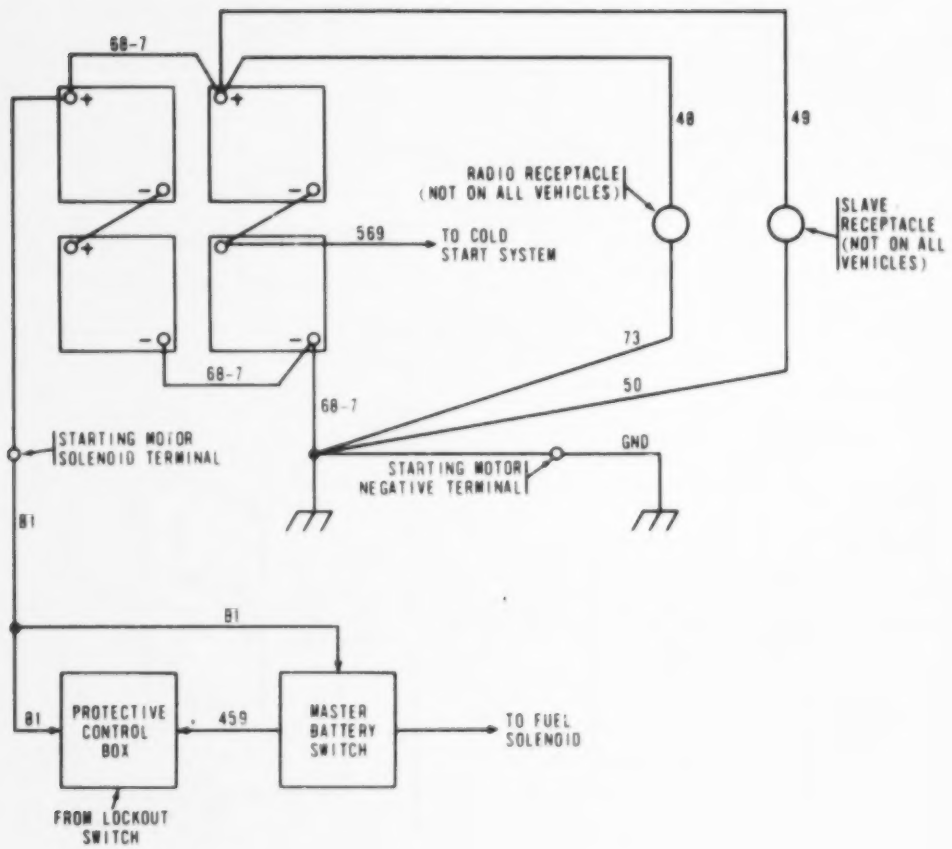
ELECTRICAL SYSTEM SUPPORT DIAGRAMS

22-1. GENERAL. This chapter gives the diagrams you need when doing trouble-shooting procedures in chapter 21. Figure 3-1 is a complete listing of all support diagrams used in this manual.



TA 118348

Figure 22-1. Starting and Associated Systems Wiring Diagram



TA 118349

Figure 22-2. Battery System Wiring Support Diagram

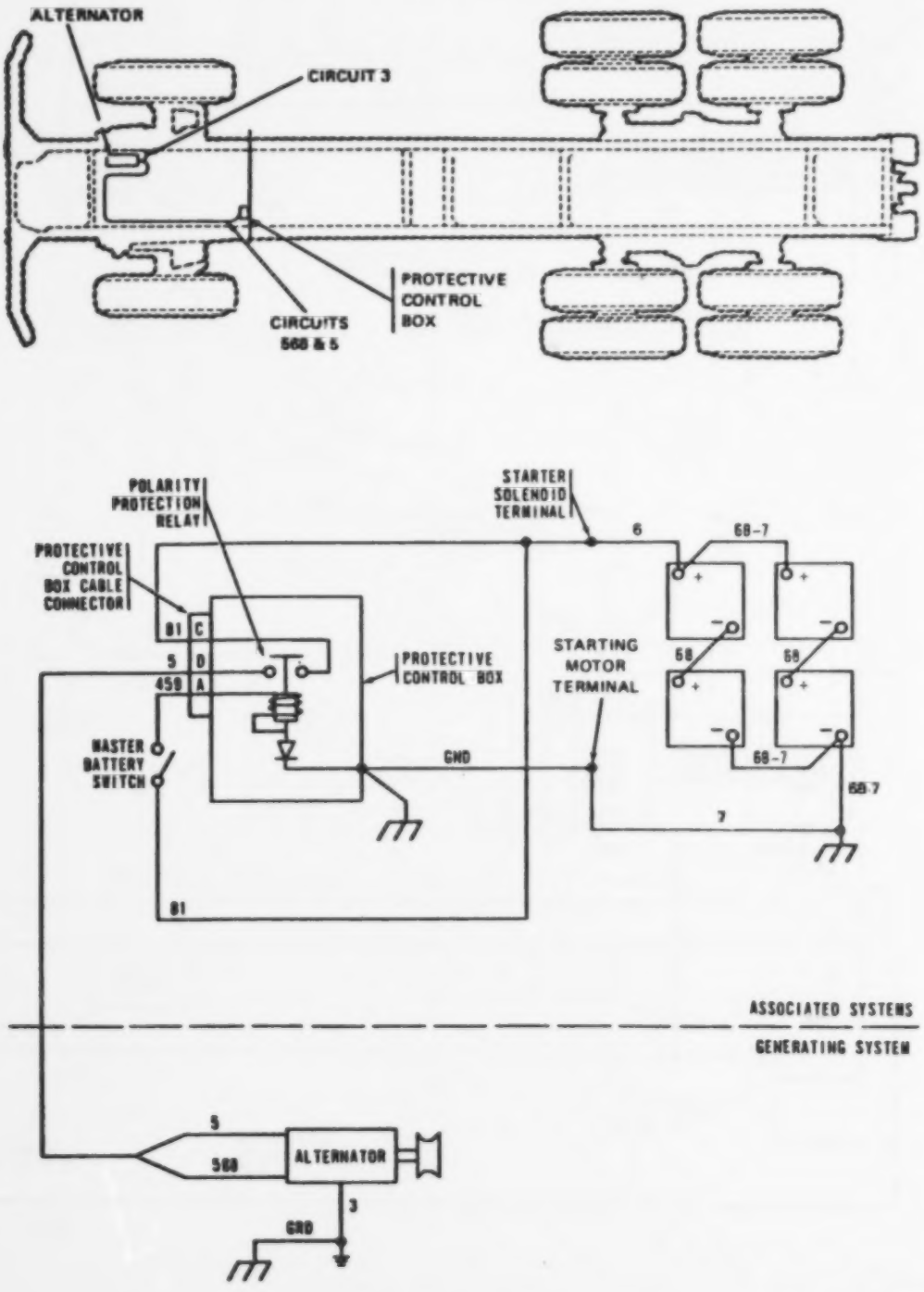
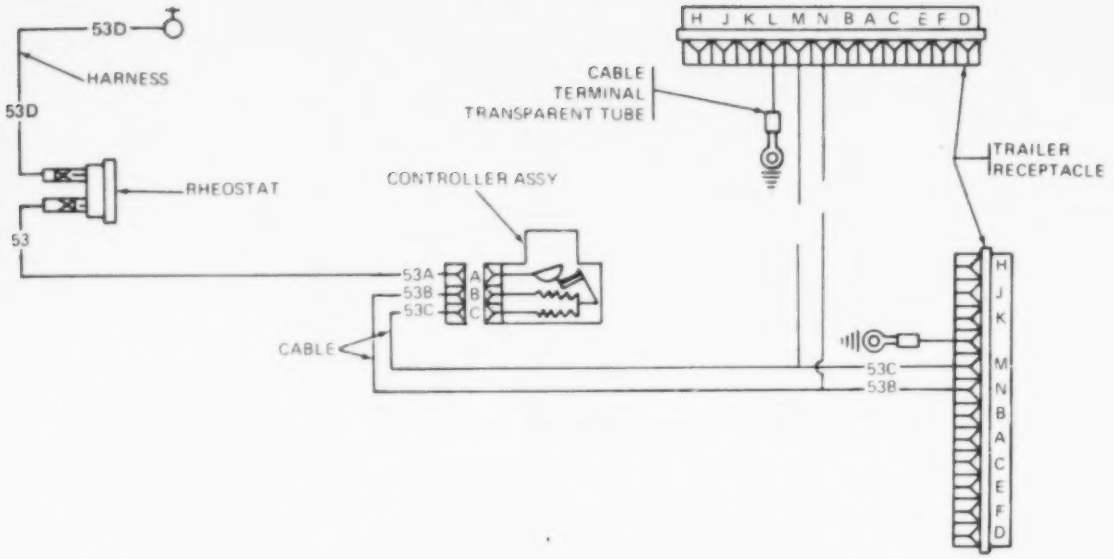
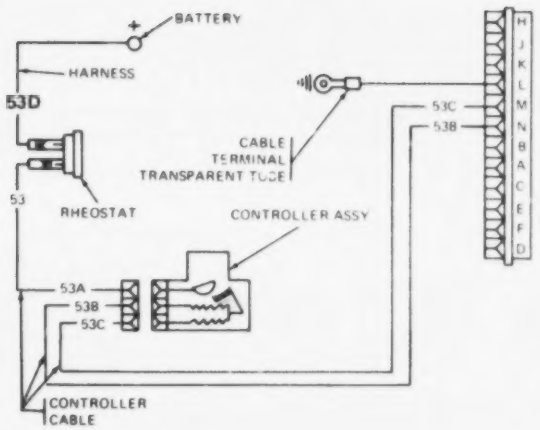


Figure 22-3. Generating and Associated Systems Wiring Support Diagram



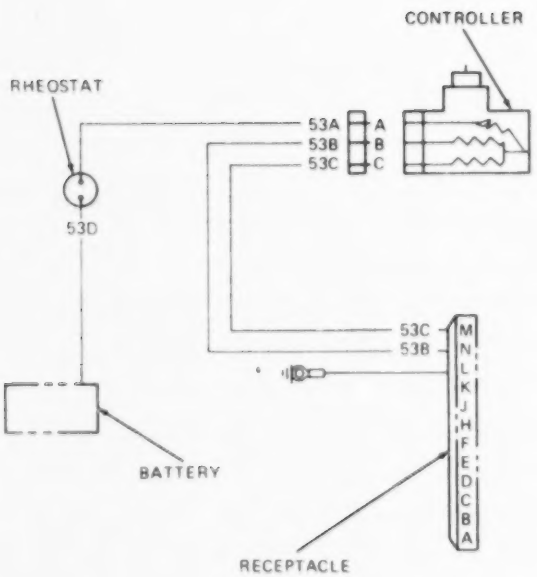
TA 118351

Figure 22-4. Electrical Brake Kit Wiring Diagram (Sheet 1 of 3)



TA 118352

Figure 22-4. Electric Brake Kit Wiring Diagram (Sheet 2 of 3)



TA 118353

Figure 22-4. Electric Brake Kit Wiring Diagram (Sheet 3 of 3)

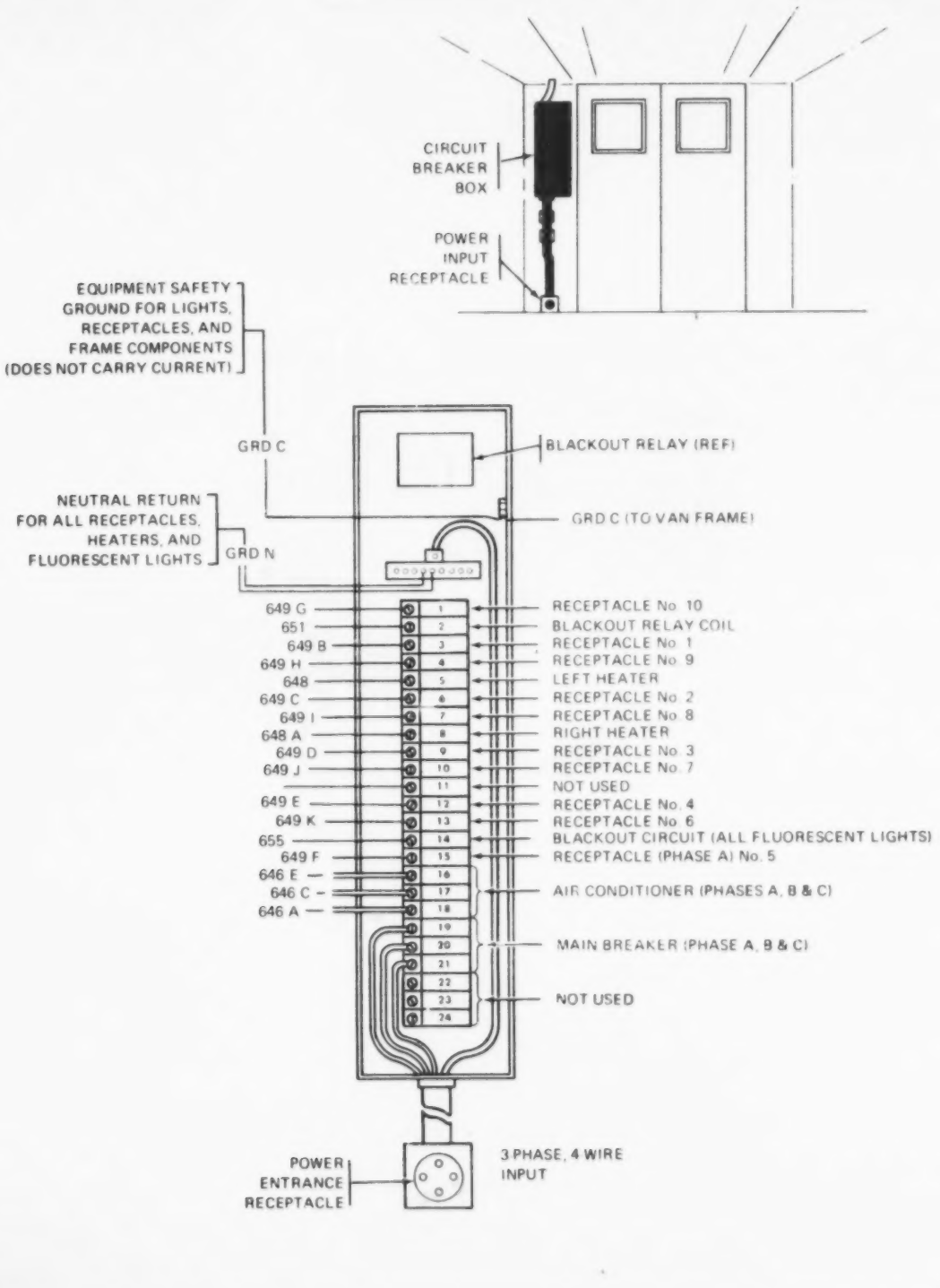
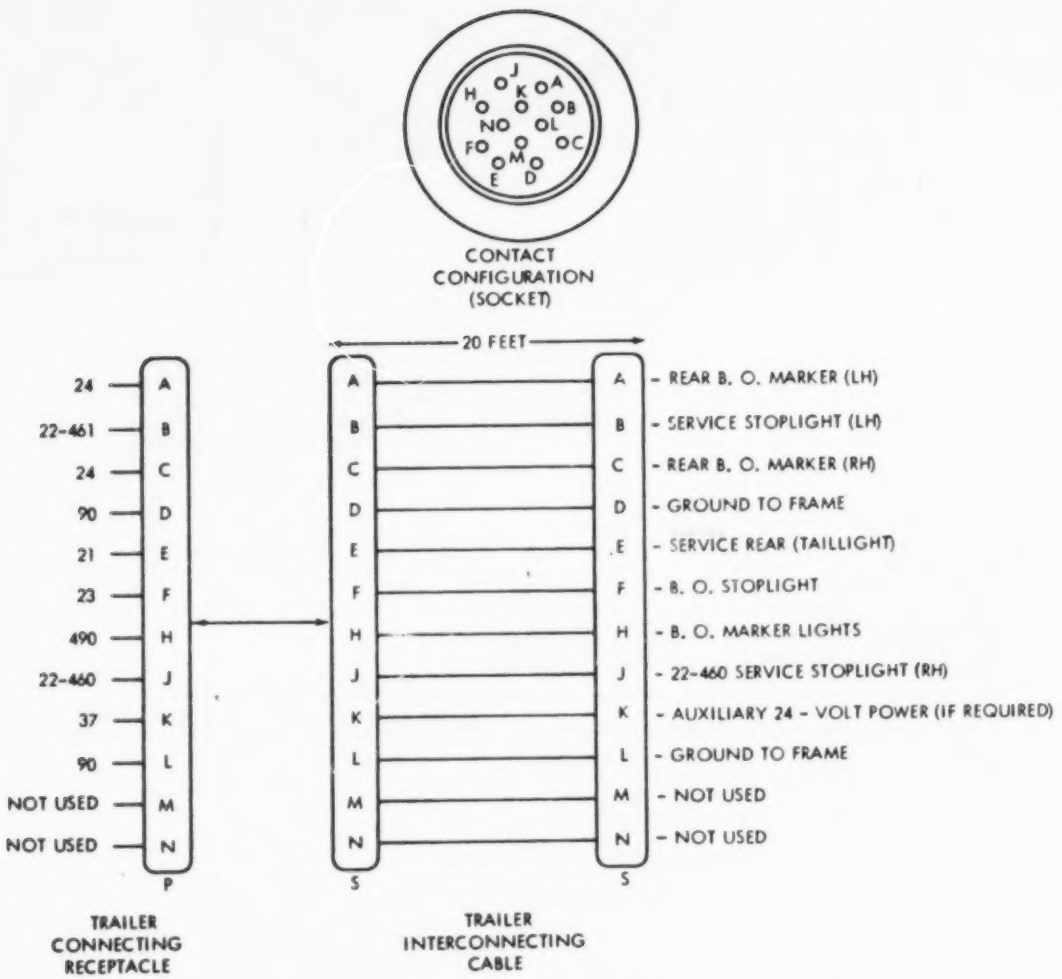
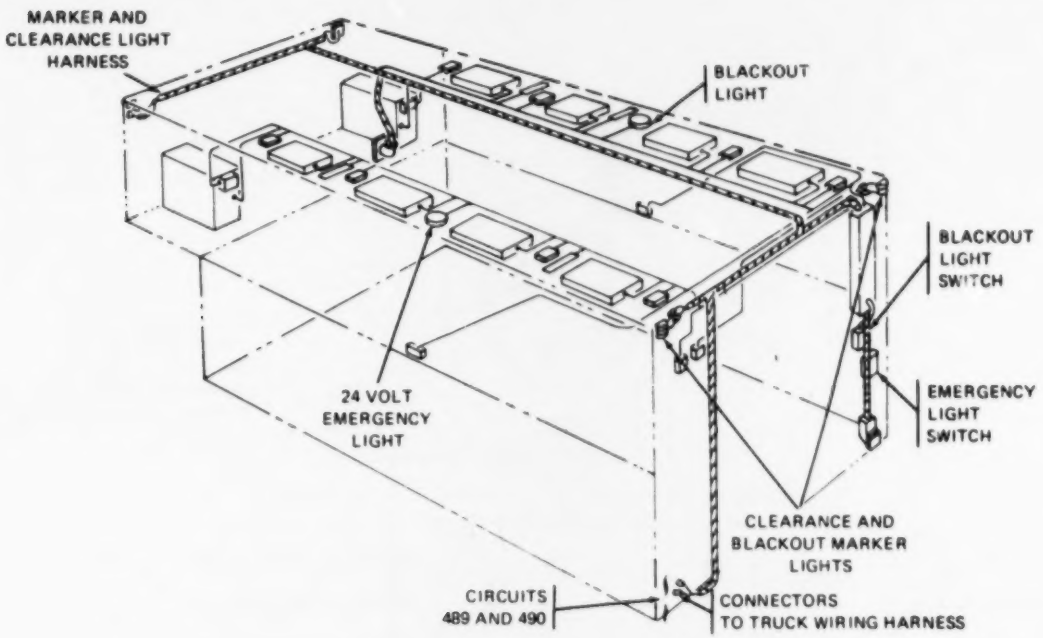


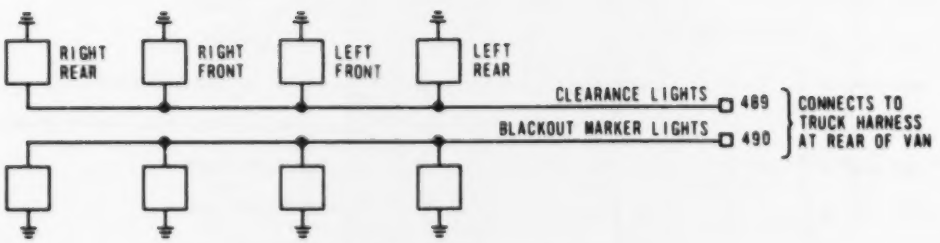
Figure 22-5. Van Body 115/228 Volt AC System Wiring Support Diagram



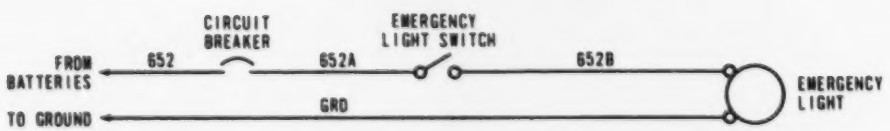
TA 118355

Figure 22-6. Trailer Interconnecting Cable Wiring Diagram





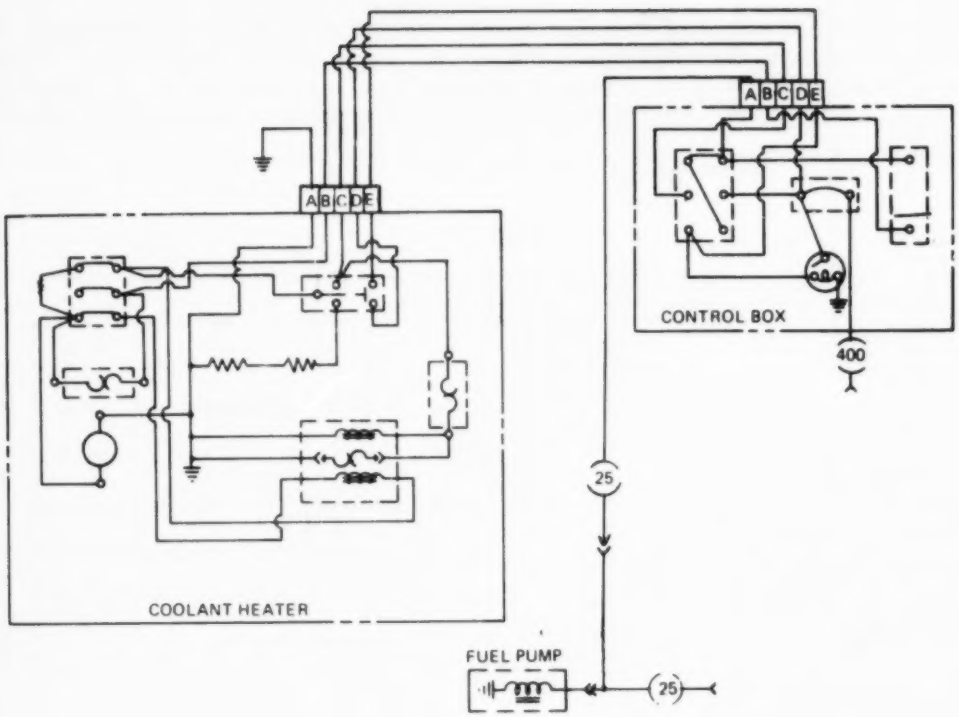
MARKER AND CLEARANCE LIGHT SYSTEM



EMERGENCY LIGHT SYSTEM

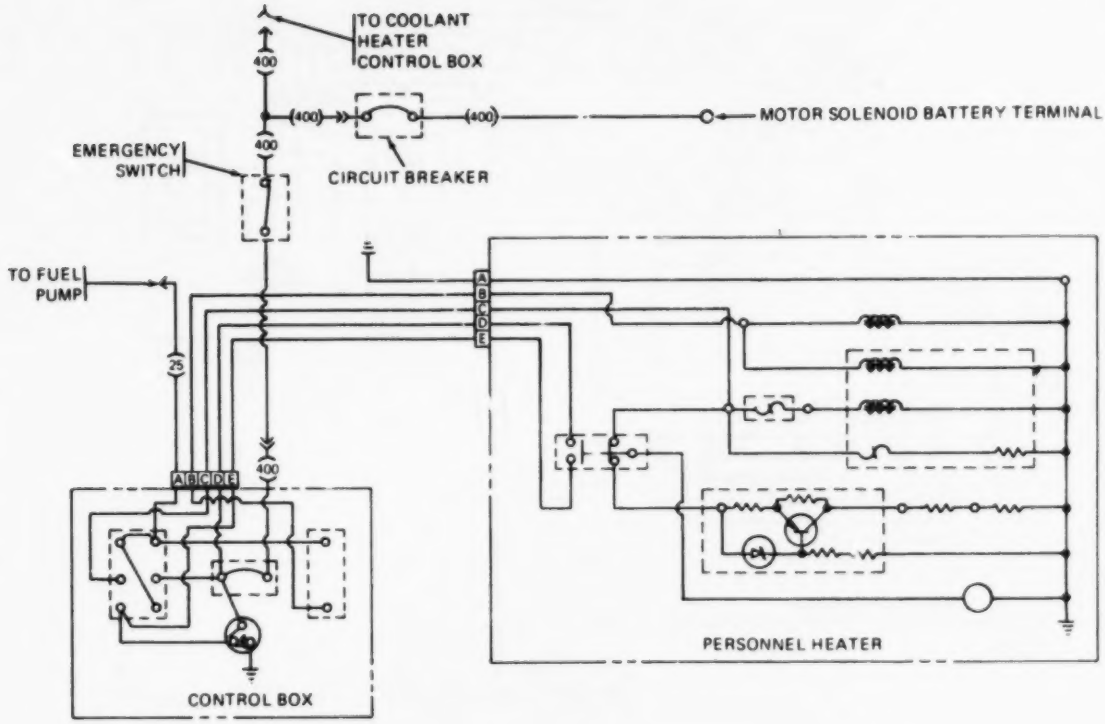
TA 118356

Figure 22-7. Van Body 24-volt System Wiring Diagram



TA 118357

Figure 22-8. Engine Coolant Heater Wiring Diagram



TA 118358

Figure 22-9. Personnel Fuel Heater Wiring Diagram

CHAPTER 23

BRAKE SYSTEM TROUBLESHOOTING

23-1. EQUIPMENT ITEMS COVERED. This chapter gives equipment troubleshooting procedures for the Brake System, for which there are authorized corrective maintenance tasks at direct support and general support level of maintenance.

23-2. EQUIPMENT ITEMS NOT COVERED. All equipment items for which corrective maintenance is authorized at direct support and general support level of maintenance are covered in this chapter.

Symptom

BUZZER DOES NOT SHUT OFF AND AIR PRESSURE GAGES READ BELOW 60 PSI

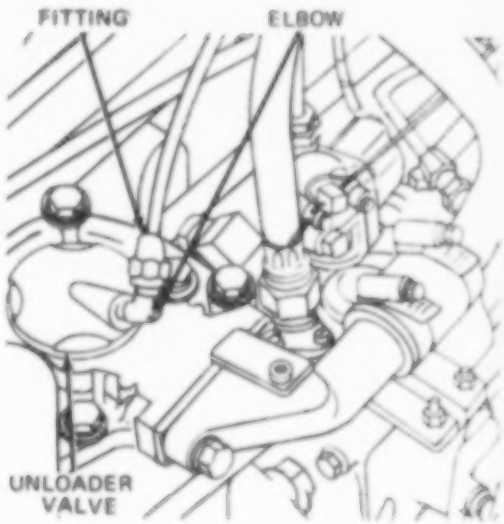
1

- Make truck ready for work on compressed air line
  - Turn off engine. Refer to TM 9-2320-260-10
  - Vent air system pressure Refer to TM 9-2320-260-20

2

- Set up unloader valve for test
  - Using 9/16-inch wrench, unscrew and take off air line fitting from unloader valve
  - Using 1/2-inch wrench unscrew and take out pipe elbow from unloader valve
  - Screw a 3/8-inch pipe plug into unloader valve and tighten using small 3/8-inch breaker bar

GO



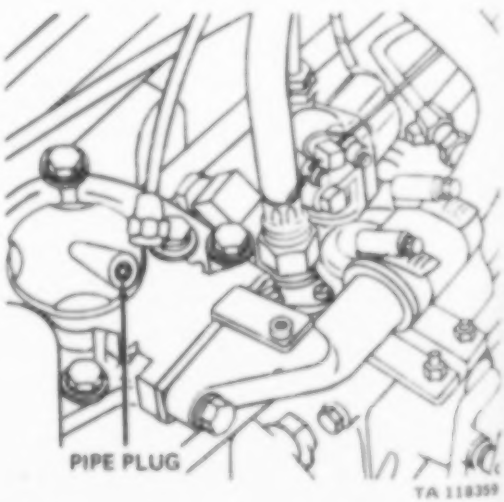


Figure 23-1 (Sheet 1 of 2)

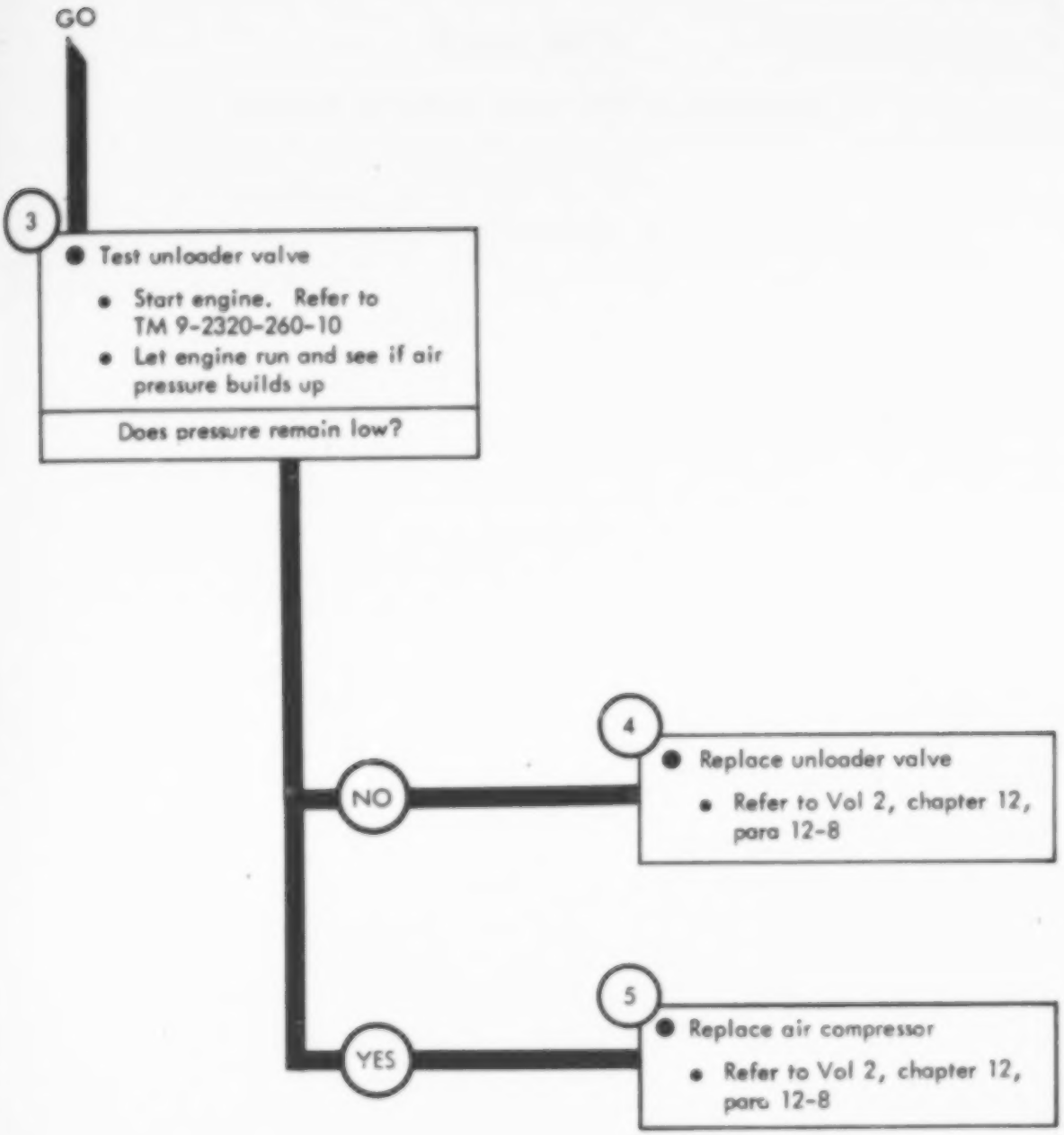
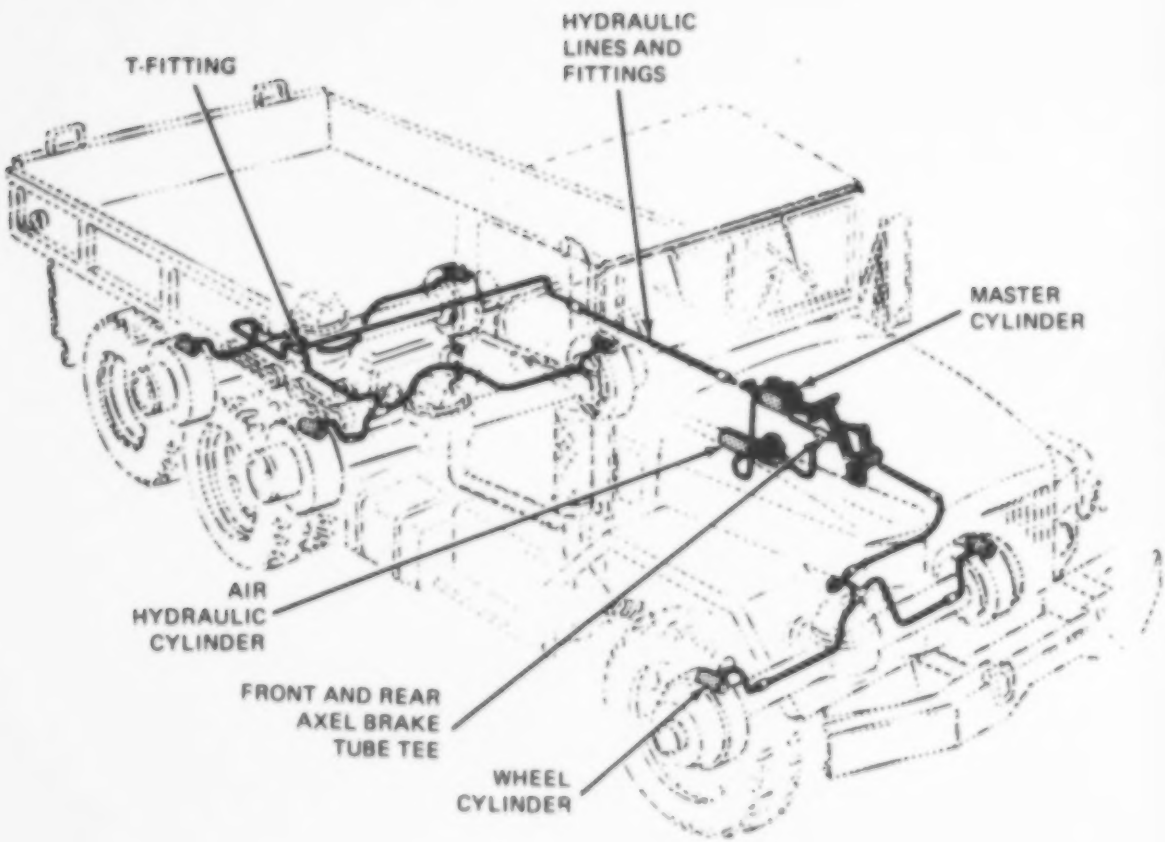


Figure 23-1 (Sheet 2 of 2)

CHAPTER 24

BRAKE SYSTEM SUPPORT DIAGRAMS

24-1. GENERAL. This chapter gives the diagrams you need when doing trouble-shooting procedures in chapter 23. Figure 3-1 is a complete listing of all support diagrams used in this manual.



TA 120150

Figure 24-1. Brake System

CHAPTER 25

STEERING SYSTEM TROUBLESHOOTING

25-1. EQUIPMENT ITEMS COVERED. This chapter gives equipment troubleshooting procedures for the Steering System, for which there are authorized corrective maintenance tasks at direct support and general support level of maintenance.

25-2. EQUIPMENT ITEMS NOT COVERED. All equipment items for which corrective maintenance is authorized at direct support and general support level of maintenance are covered in this chapter.

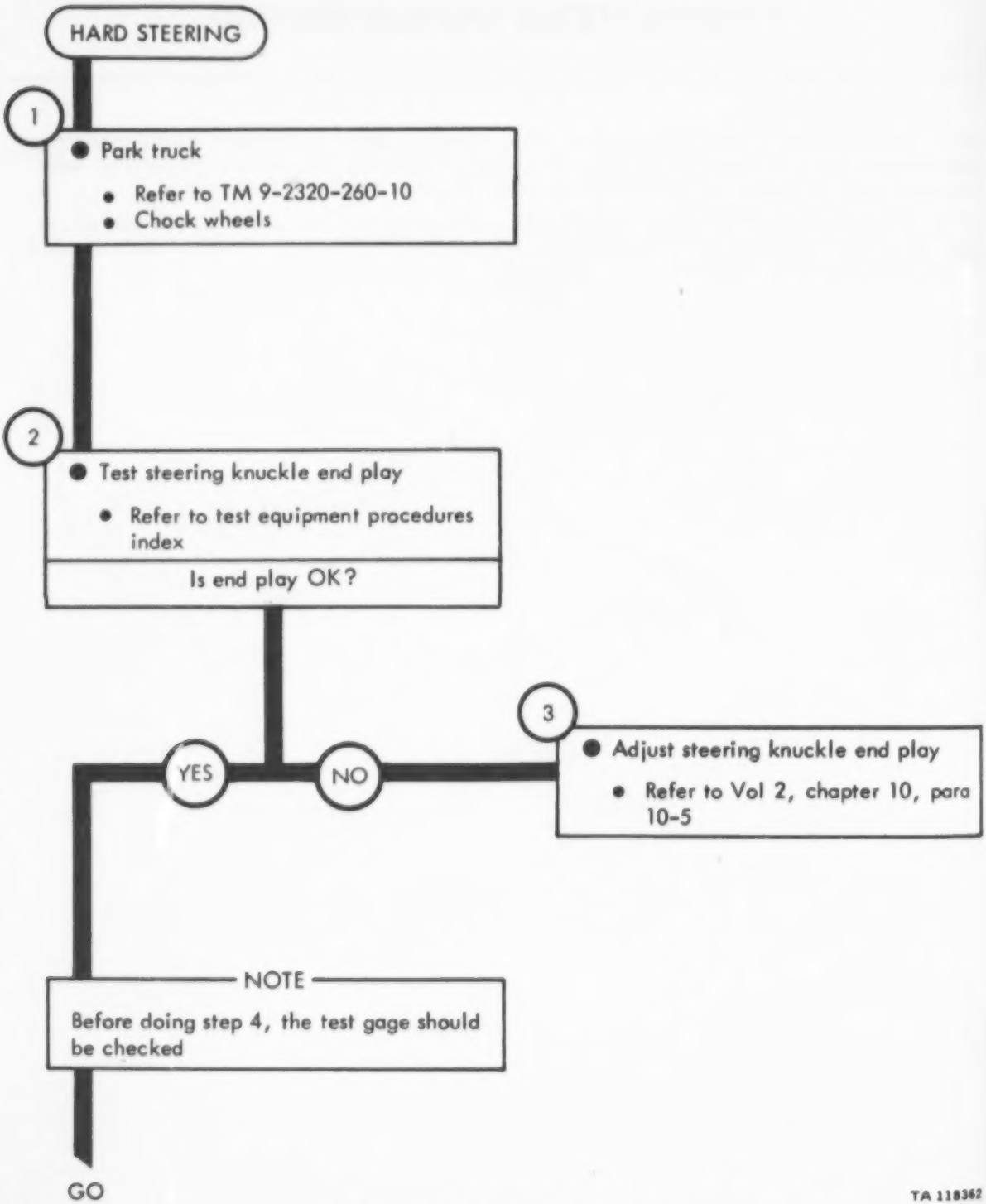
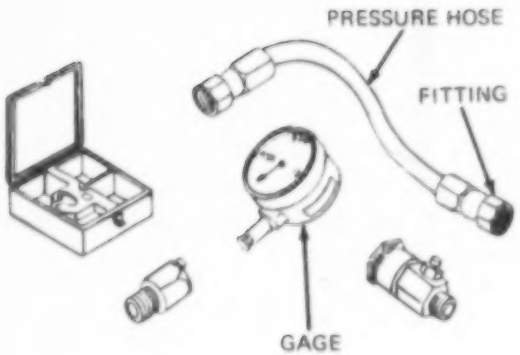


Figure 25-1 (Sheet 1 of 7)

GO

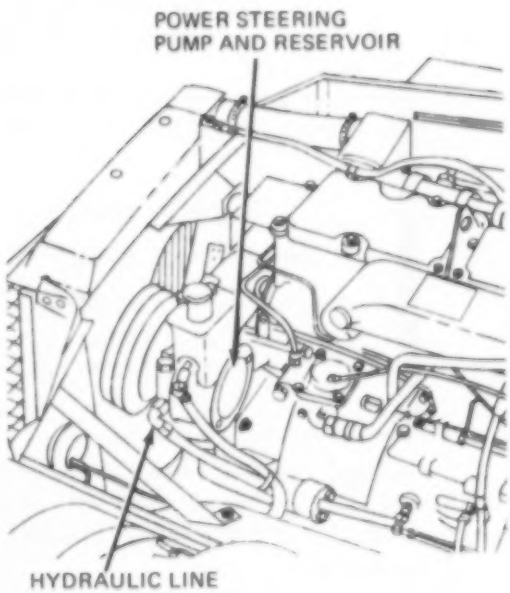
4

- Check power steering oil pressure test set before using
  - Gage - Look to see that the glass and needle are not broken
  - Pressure hose - Look to see that there are no holes, cracks, or sharp bends
  - Fittings - Feel if fittings are tight on both ends. Look to see that the input end is dirt free



5

- Set up pressure test on power steering pump
  - Put a can, or bucket, under power steering pump
  - Using 9/16-inch wrench unscrew and take off hydraulic line from power steering pump and put lines on can, or bucket
  - Put test set on power steering pump fitting and tighten, using 9/16-inch wrench
  - Put hydraulic line on test set adapter and tighten using 9/16-inch wrench
  - Remove can, or bucket from under pump and fill power steering fluid reservoir. Refer to LO 9-2320-260-12



GO

TA 118363

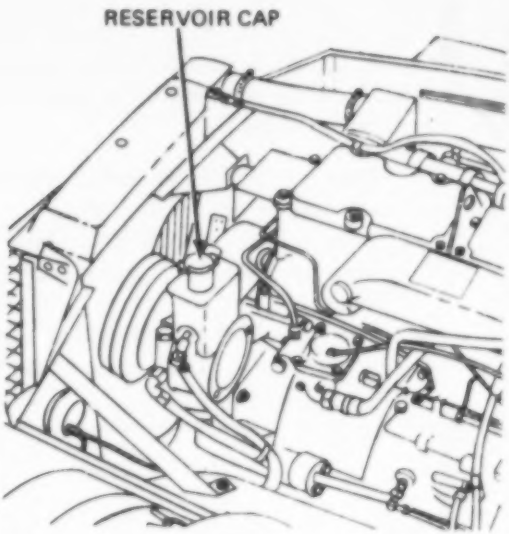
Figure 25-1 (Sheet 2 of 7)

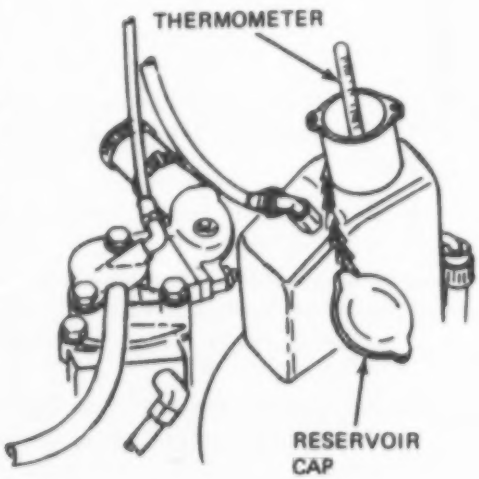
GO

6

- Set power steering system to operating temperature
  - Start engine, and let it run at idle speed. Refer to TM 9-2320-260-10
  - Take off power steering pump reservoir cap
  - Put a thermometer in reservoir
  - Let engine run until thermometer shows a temperature range of 120°F to 150°F

    Note: When power steering oil reaches temperature range take out thermometer. Put back reservoir cap and tighten





The next step will need the use of two soldiers. The lead soldier will be called Soldier A, and the helper will be called Soldier B

GO

TA 118364

Figure 25-1 (Sheet 3 of 7)

GO

7

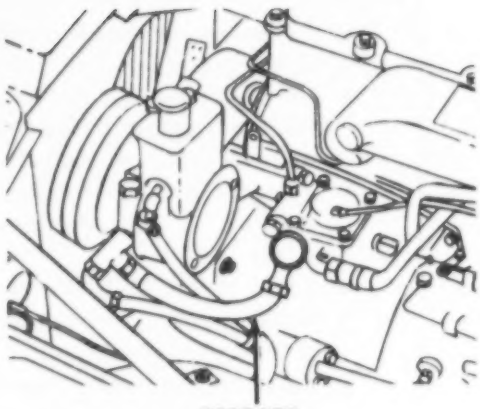
- Do power steering pump pressure test

SOLDIER B • Go to drivers seat and wait for instructions from Soldier A

SOLDIER A • Go to test gage and tell Soldier B to turn the wheel all the way to lock position

Note: Pressure during turning should be between 300 and 500 psi. Pressure should be between 800 to 900 psi at full lock When steering wheel is stopped in any direction, the pressure will return to 0 psi

Are pressure readings OK?



TEST SET

YES

NO

8

- Remove test set from power steering pump
  - Refer to step 9
- Replace power steering pump
  - Refer to Vol 2, chapter 2, para 2-82

NOTE

Before doing step 10, test set must be removed from power steering pump

GO

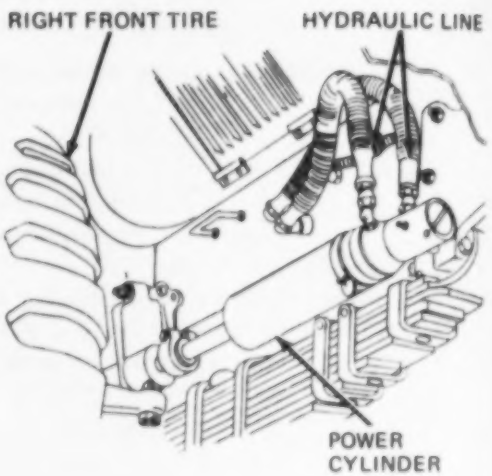
TA 118365

Figure 25-1 (Sheet 4 of 7)

GO

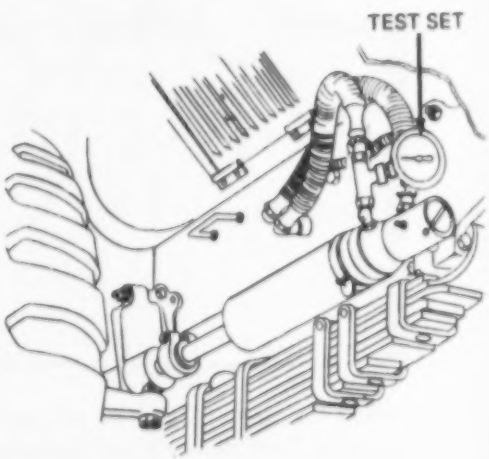
9

- Remove test set from power steering pump
  - Put a can, or bucket, under power steering pump
  - Using 9/16-inch wrench unscrew and take off hydraulic line from test set, and put in can or bucket
  - Using 9/16-inch wrench unscrew and take off test set from power steering pump
  - Screw hydraulic line on power steering pump, and tighten using 9/16-inch wrench
  - Take can, or bucket, out from under power steering pump



10

- Set up pressure test on power cylinder
  - Put a can, or bucket, under power cylinder
  - Using 9/16-inch wrench unscrew and take off hydraulic line from power cylinder and put fitting end in a can or bucket
    Note: This test will have to be done to both hydraulic lines going to power cylinder
  - Put test set on power cylinder and tighten, using 9/16-inch wrench
  - Put hydraulic line on adapter and tighten using 9/16-inch wrench
  - Fill power steering fluid reservoir Refer to LO 9-2320-260-12
- Set power steering system to operating temperature
  - Refer to step 6



GO

TA 118366

Figure 25-1 (Sheet 5 of 7)

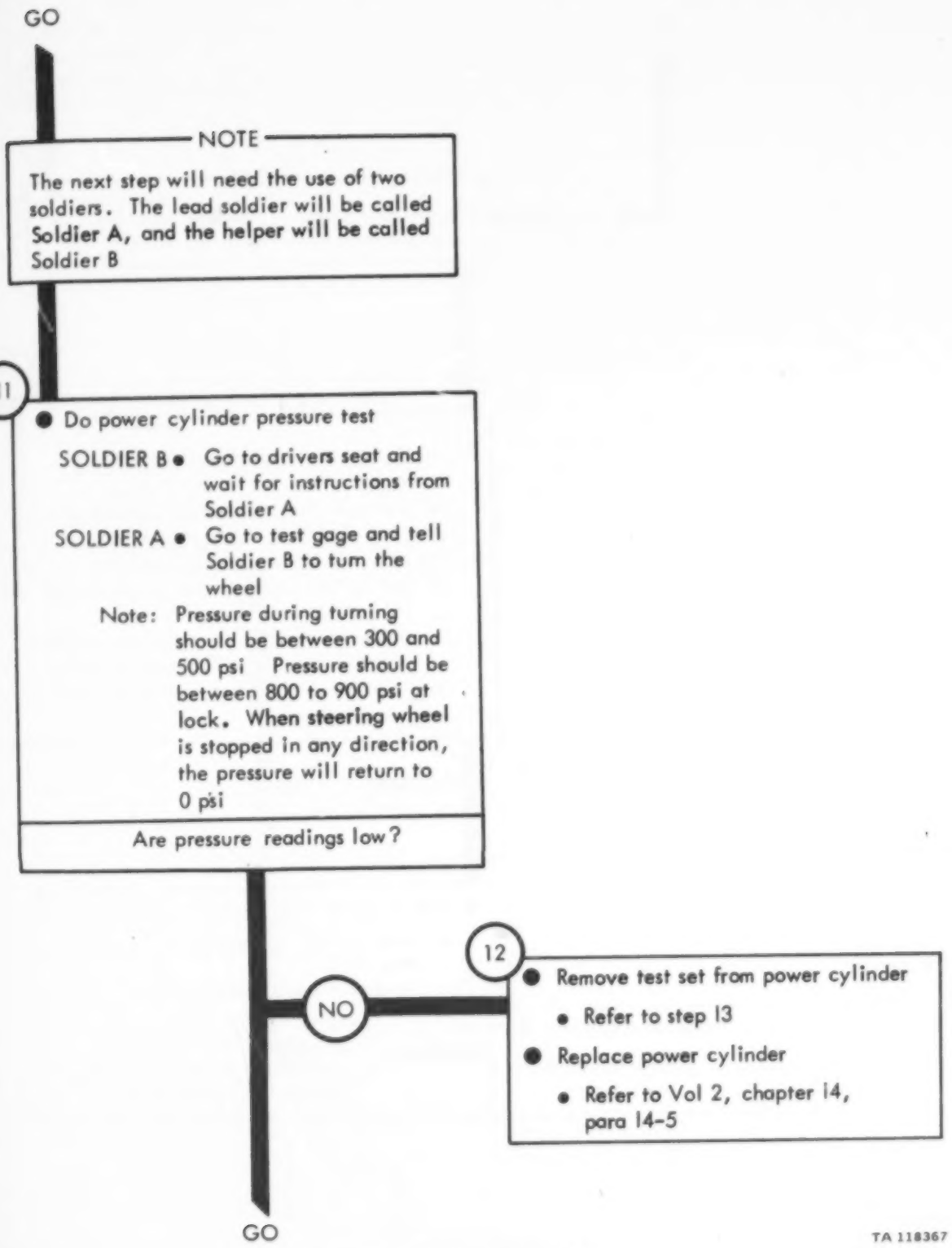
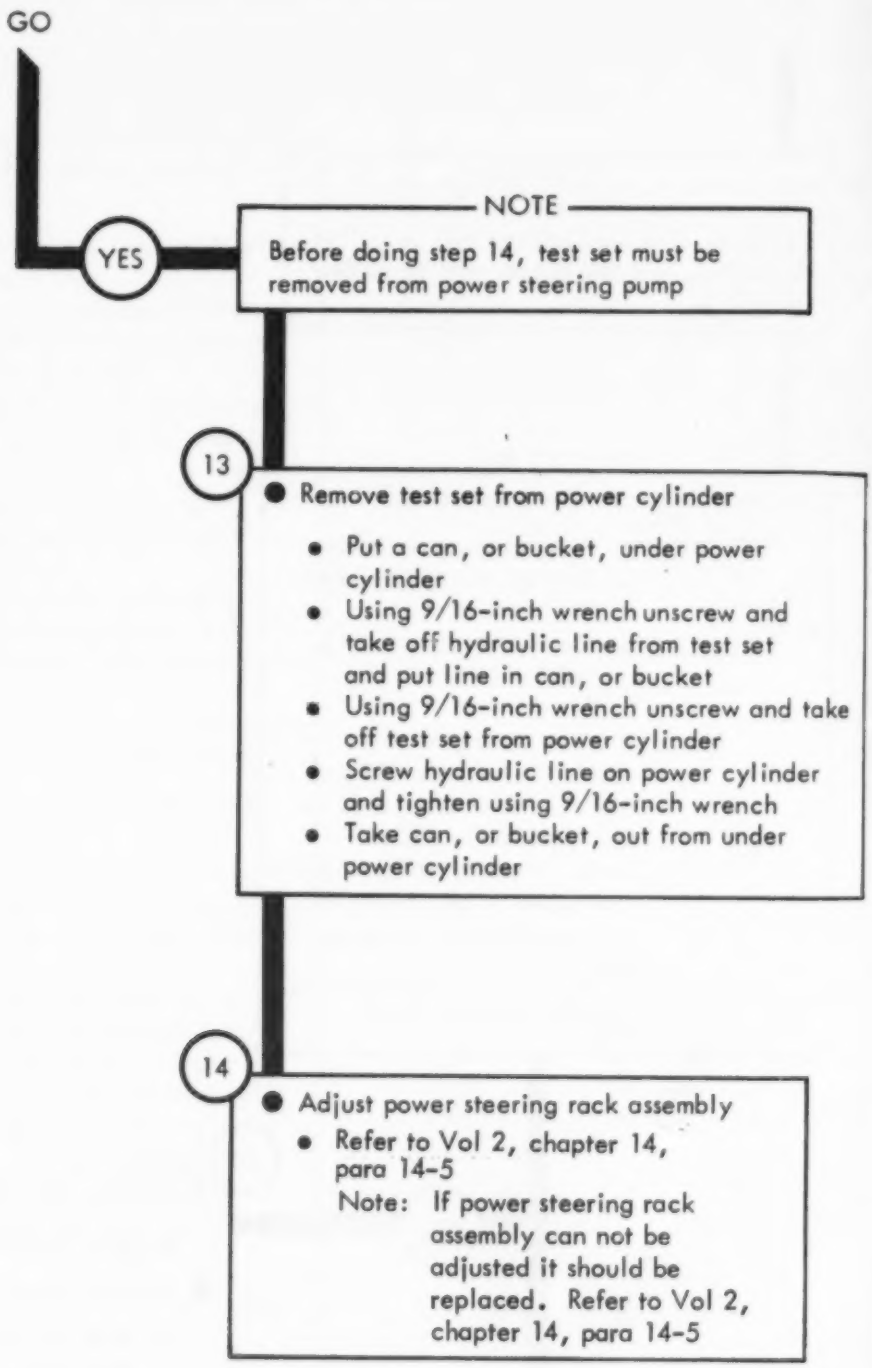

GO
NOTE
The next step will need the use of two soldiers. The lead soldier will be called Soldier A, and the helper will be called Soldier B
11
● Do power cylinder pressure test
SOLDIER B ● Go to drivers seat and wait for instructions from Soldier A
SOLDIER A ● Go to test gage and tell Soldier B to turn the wheel
Note: Pressure during turning should be between 300 and 500 psi Pressure should be between 800 to 900 psi at lock. When steering wheel is stopped in any direction, the pressure will return to 0 psi
Are pressure readings low?
NO
12
● Remove test set from power cylinder
● Refer to step 13
● Replace power cylinder
● Refer to Vol 2, chapter 14, para 14-5
GO
TA 118367

Figure 25-1 (Sheet 6 of 7)


GO
YES
NOTE
Before doing step 14, test set must be removed from power steering pump
13
Remove test set from power cylinder
Put a can, or bucket, under power cylinder
Using 9/16-inch wrench unscrew and take off hydraulic line from test set and put line in can, or bucket
Using 9/16-inch wrench unscrew and take off test set from power cylinder
Screw hydraulic line on power cylinder and tighten using 9/16-inch wrench
Take can, or bucket, out from under power cylinder
14
Adjust power steering rack assembly
Refer to Vol 2, chapter 14, para 14-5
Note: If power steering rack assembly can not be adjusted it should be replaced. Refer to Vol 2, chapter 14, para 14-5

TA 118368

Figure 25-1 (Sheet 7 of 7)

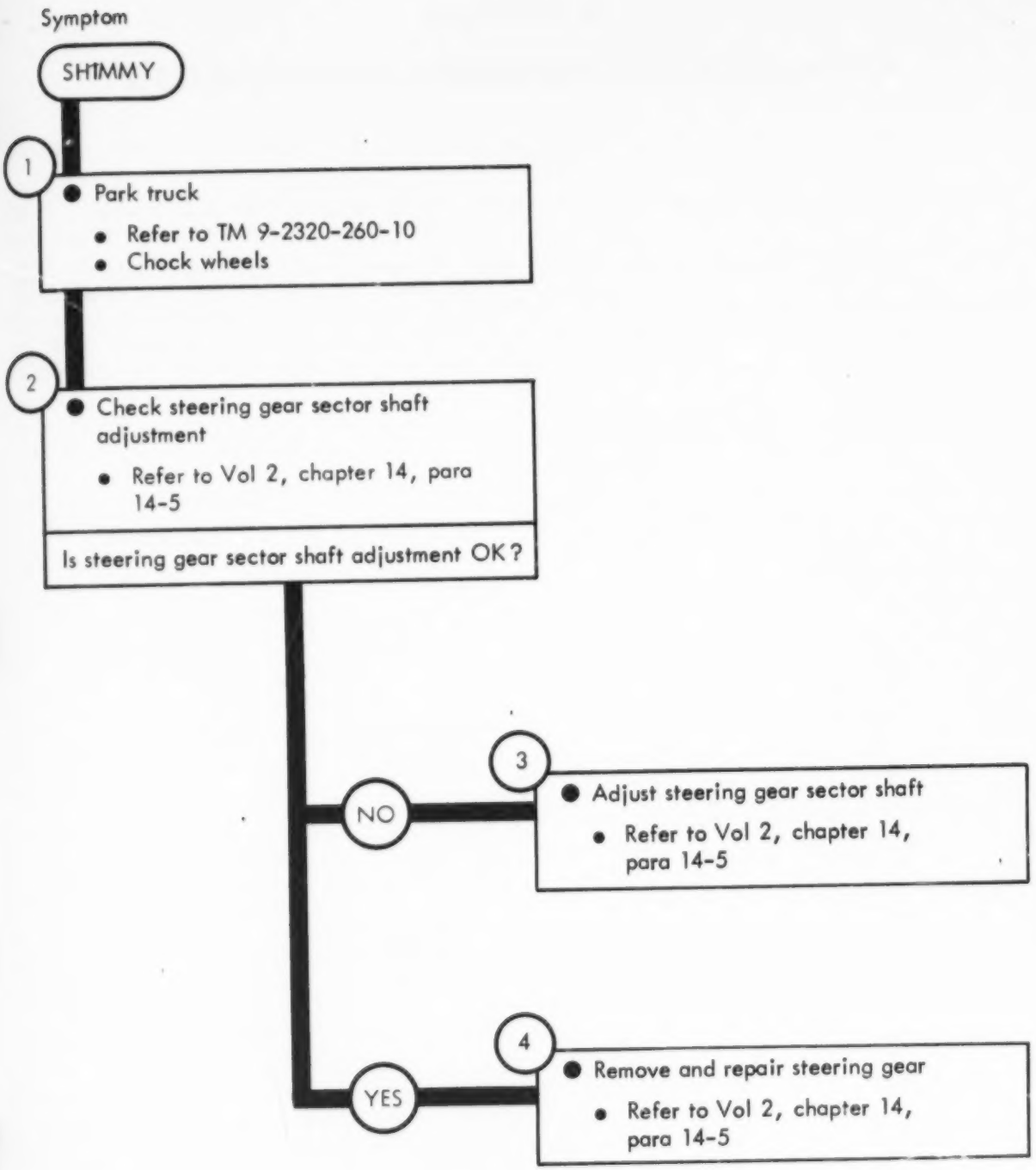

Symptom
SHIMMY
1
Park truck
Refer to TM 9-2320-260-10
Chock wheels
2
Check steering gear sector shaft adjustment
Refer to Vol 2, chapter 14, para 14-5
Is steering gear sector shaft adjustment OK?
NO
3
Adjust steering gear sector shaft
Refer to Vol 2, chapter 14, para 14-5
YES
4
Remove and repair steering gear
Refer to Vol 2, chapter 14, para 14-5
TA 118369

Figure 25-2

CHAPTER 26

STEERING SYSTEM TROUBLESHOOTING SUMMARY

26-1. GENERAL. This chapter gives a summary of troubleshooting procedures given in chapter 25, for the Steering System.

26-2. PROCEDURES. The summary in this chapter covers all fault symptoms found in the detailed troubleshooting procedures. Chapter 7 outlines a sample trouble-shooting procedure. The summary procedures are based on the "what-to-do" portions of the detailed procedures and do not include the "how-to-do-it" instructions. Warnings, cautions, and notes are given where needed.

STEERING SYSTEM TROUBLESHOOTING SUMMARY

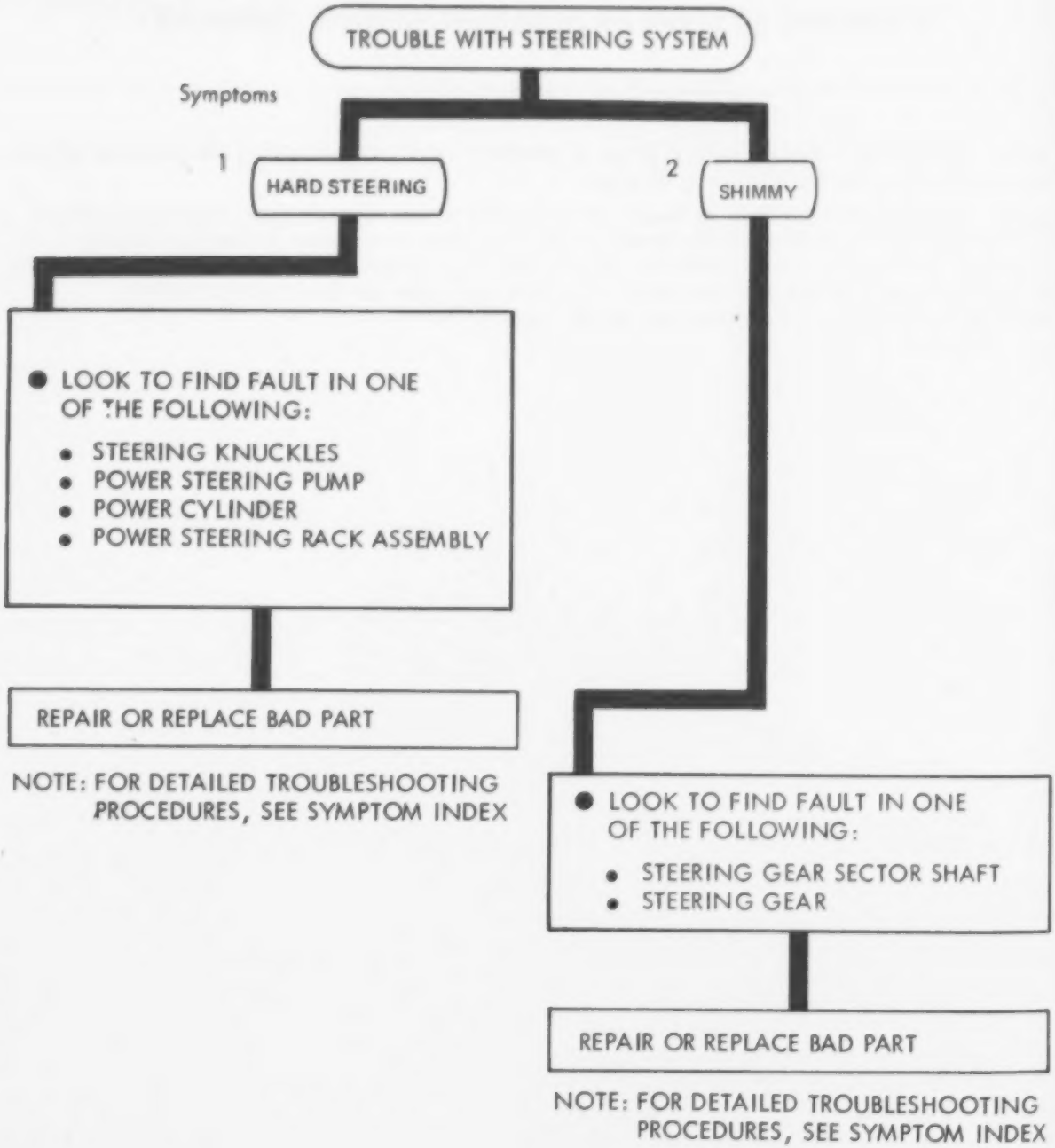
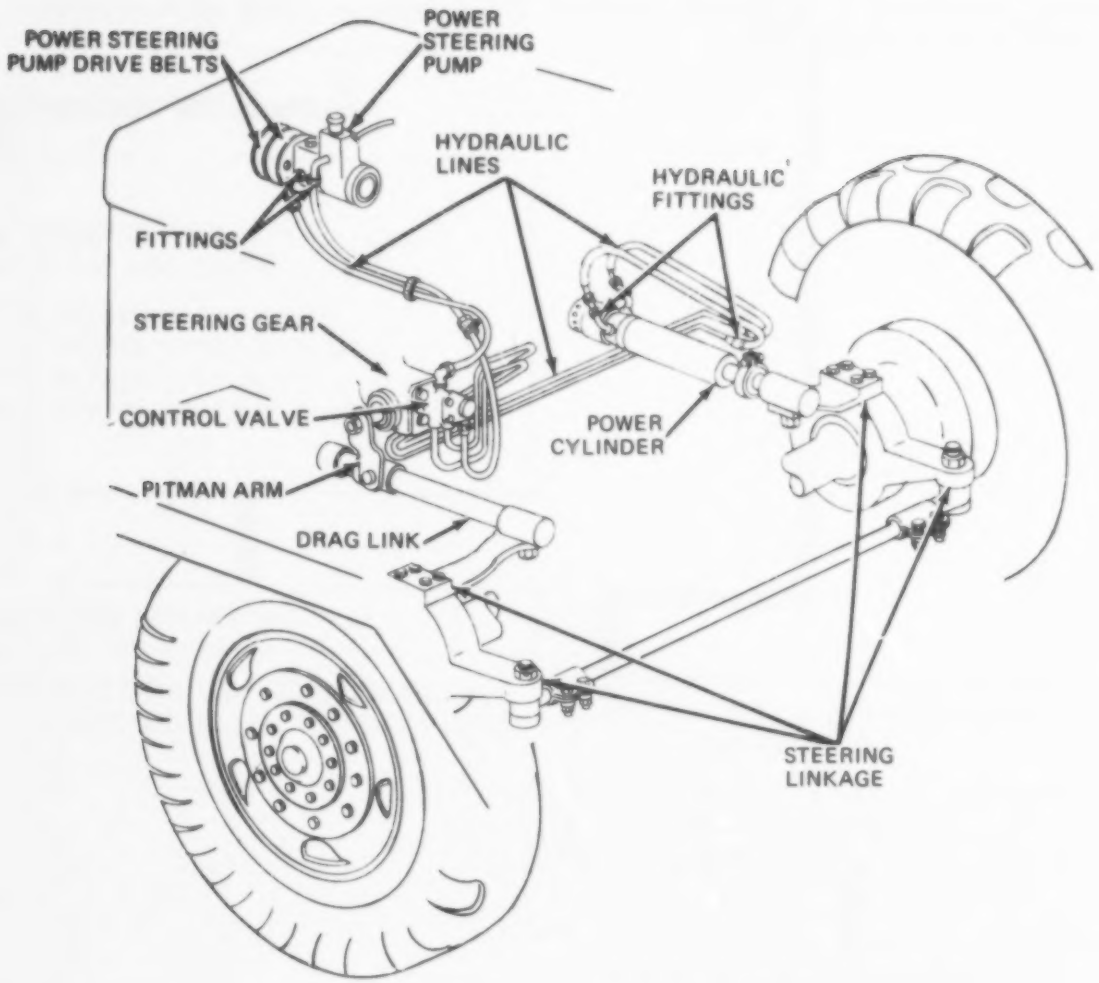

TROUBLE WITH STEERING SYSTEM
Symptoms
1
HARD STEERING
2
SHIMMY
● LOOK TO FIND FAULT IN ONE OF THE FOLLOWING:
• STEERING KNUCKLES
• POWER STEERING PUMP
• POWER CYLINDER
• POWER STEERING RACK ASSEMBLY
REPAIR OR REPLACE BAD PART
NOTE: FOR DETAILED TROUBLESHOOTING PROCEDURES, SEE SYMPTOM INDEX
● LOOK TO FIND FAULT IN ONE OF THE FOLLOWING:
• STEERING GEAR SECTOR SHAFT
• STEERING GEAR
REPAIR OR REPLACE BAD PART
NOTE: FOR DETAILED TROUBLESHOOTING PROCEDURES, SEE SYMPTOM INDEX
TA 118370

Figure 26-1

CHAPTER 27

STEERING SYSTEM SUPPORT DIAGRAMS

27-1. GENERAL. This chapter gives the diagrams you need when doing trouble-shooting procedures in chapter 25. Figure 3-1 is a complete listing of all support diagrams used in this manual.



TA 118371

Figure 27-1. Steering System

CHAPTER 28

VAN TAILGATE SYSTEM TROUBLESHOOTING

28-1. EQUIPMENT ITEMS COVERED. This chapter gives equipment troubleshooting procedures for the Van Tailgate System, for which there are authorized corrective maintenance tasks at direct support and general support level of maintenance.

28-2. EQUIPMENT ITEMS NOT COVERED. All equipment items for which corrective maintenance is authorized at direct support and general support level of maintenance are covered in this chapter.

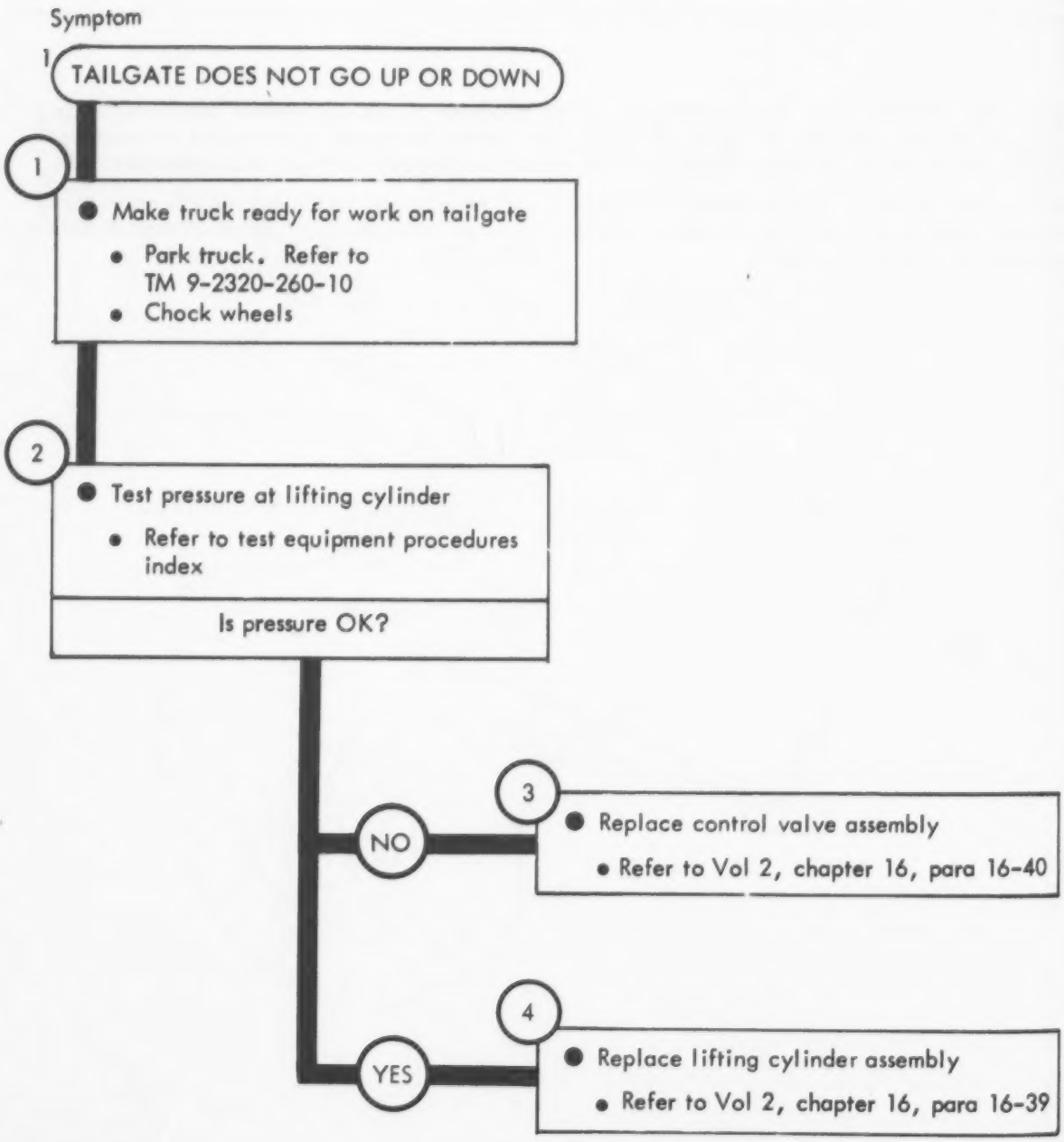

Symptom
1
TAILGATE DOES NOT GO UP OR DOWN
1
Make truck ready for work on tailgate
Park truck. Refer to TM 9-2320-260-10
Chock wheels
2
Test pressure at lifting cylinder
Refer to test equipment procedures index
Is pressure OK?
NO
3
Replace control valve assembly
Refer to Vol 2, chapter 16, para 16-40
YES
4
Replace lifting cylinder assembly
Refer to Vol 2, chapter 16, para 16-39
TA 118372

Figure 28-1

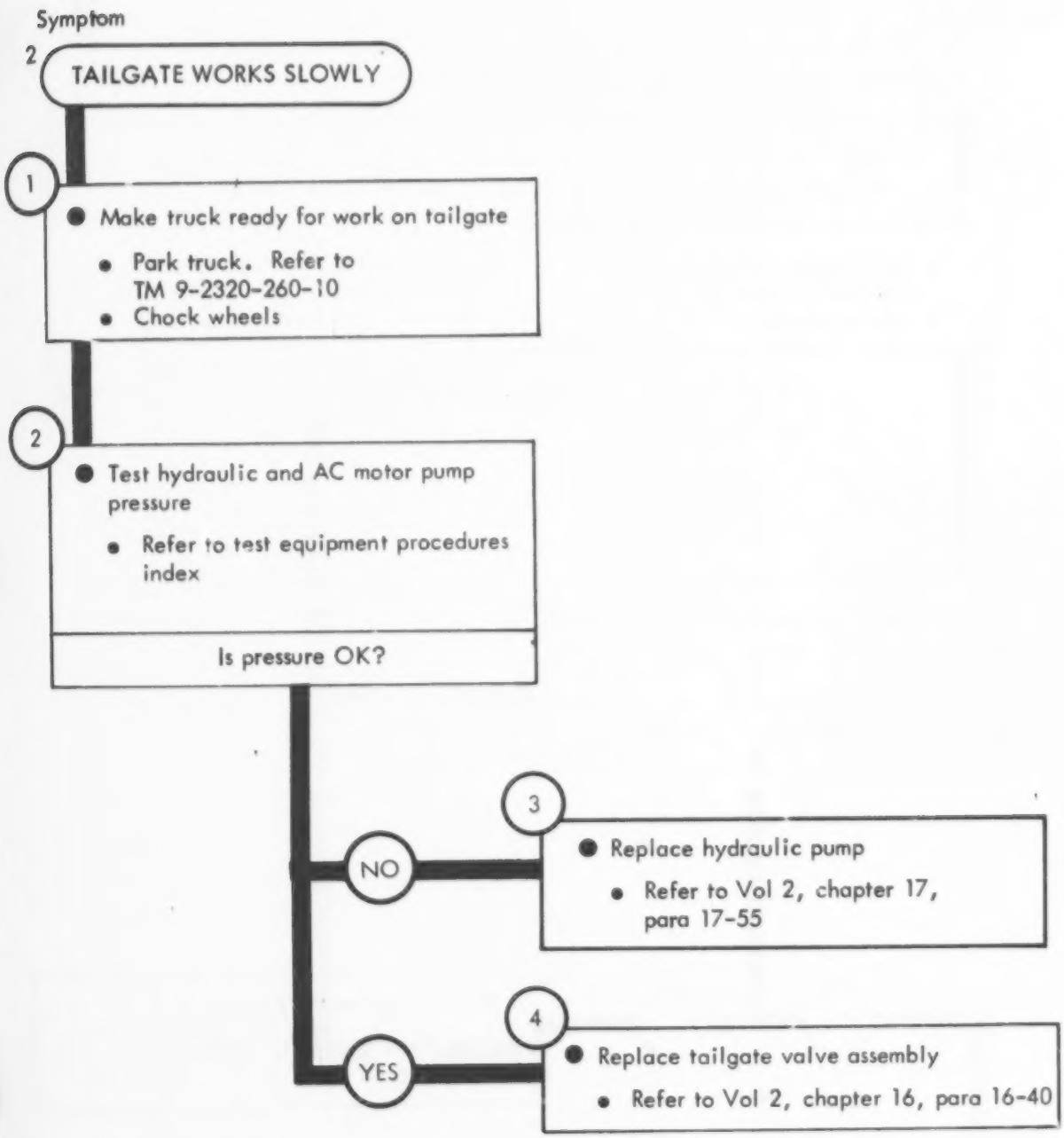

Symptom
2
TAILGATE WORKS SLOWLY
1
Make truck ready for work on tailgate
Park truck. Refer to TM 9-2320-260-10
Chock wheels
2
Test hydraulic and AC motor pump pressure
Refer to test equipment procedures index
Is pressure OK?
NO
3
Replace hydraulic pump
Refer to Vol 2, chapter 17, para 17-55
YES
4
Replace tailgate valve assembly
Refer to Vol 2, chapter 16, para 16-40
TA 118373

Figure 28-2

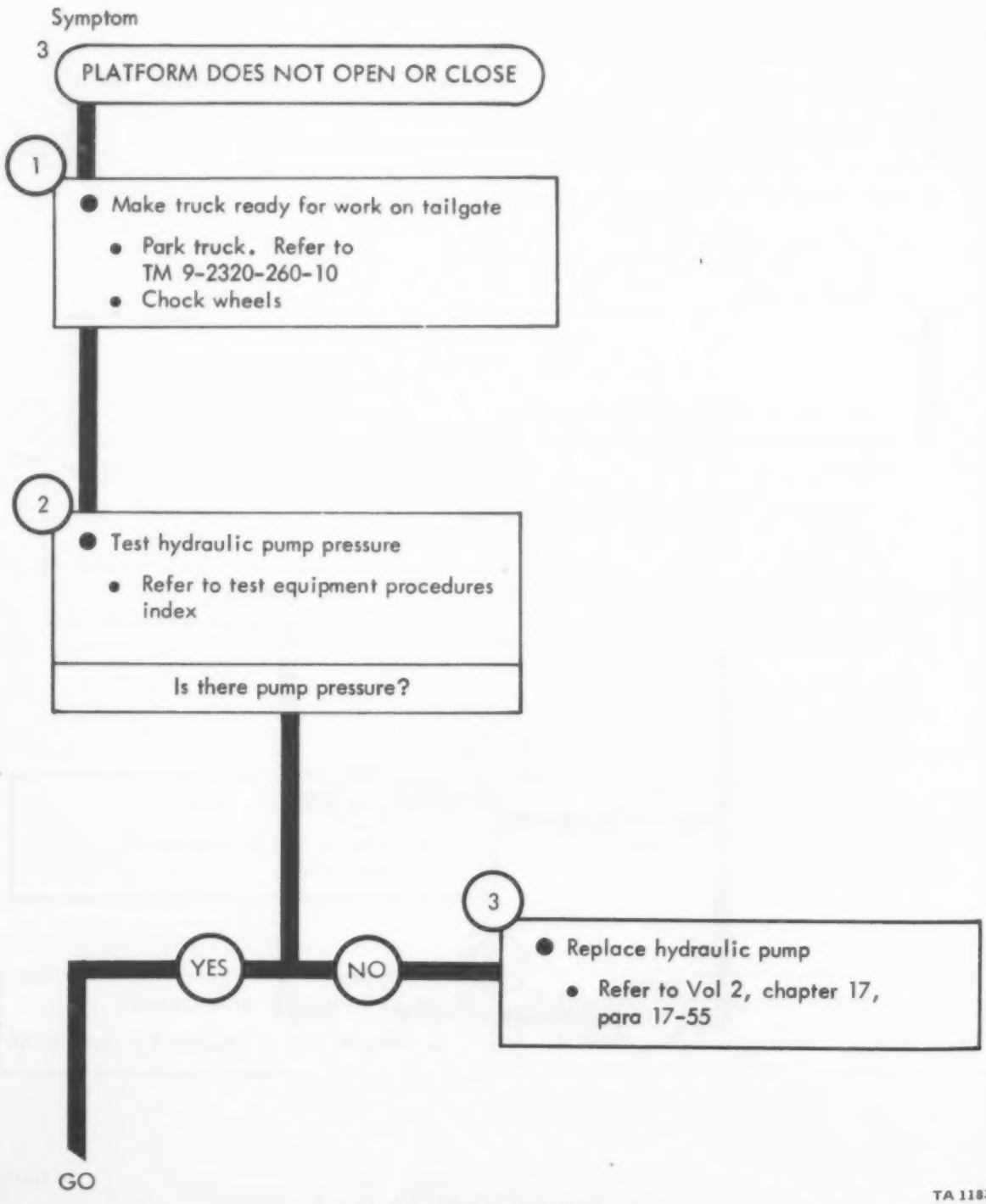


Figure 28-3 (Sheet 1 of 2)

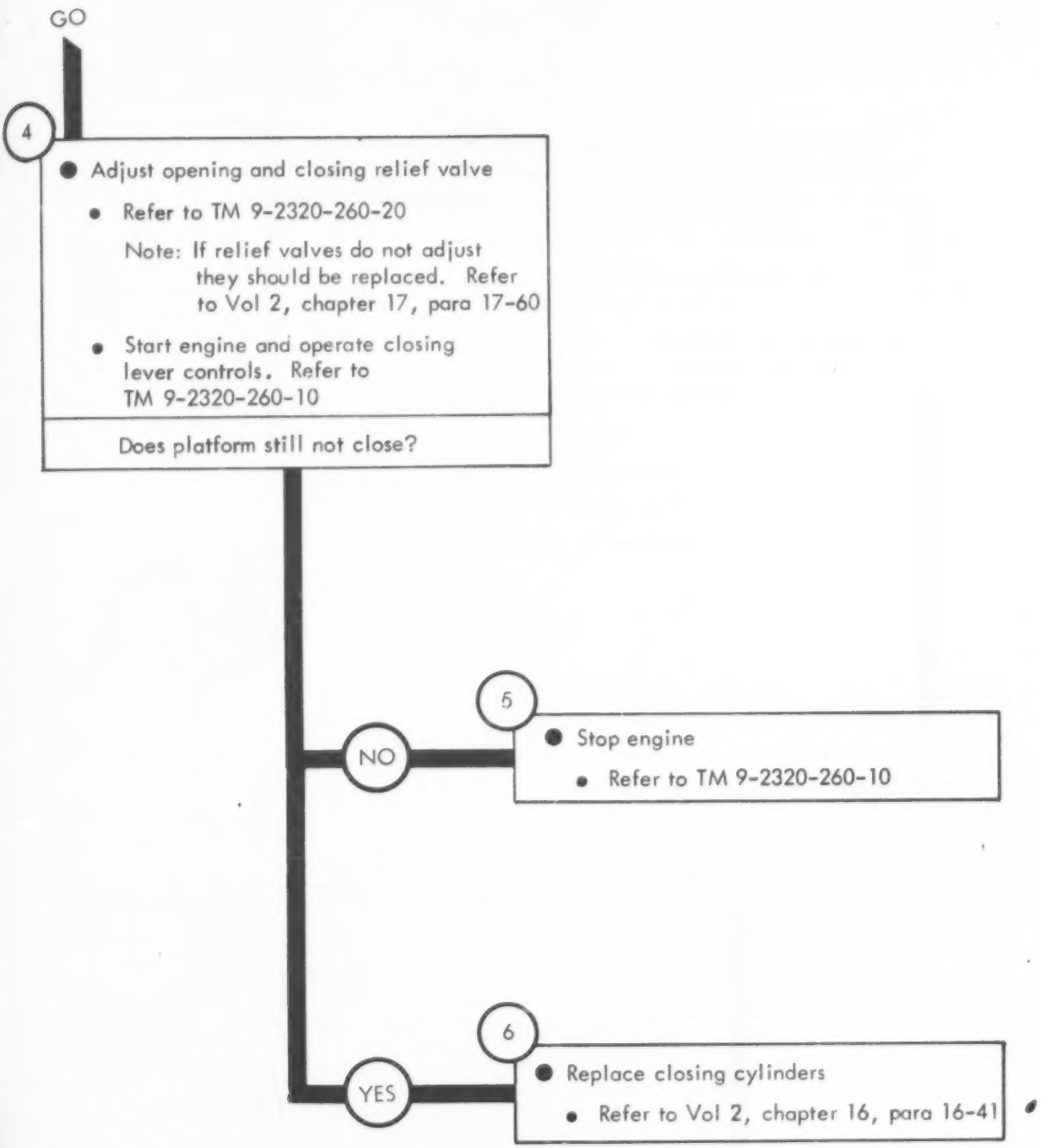

GO
4
● Adjust opening and closing relief valve
• Refer to TM 9-2320-260-20
Note: If relief valves do not adjust they should be replaced. Refer to Vol 2, chapter 17, para 17-60
• Start engine and operate closing lever controls. Refer to TM 9-2320-260-10
Does platform still not close?
NO
5
● Stop engine
• Refer to TM 9-2320-260-10
YES
6
● Replace closing cylinders
• Refer to Vol 2, chapter 16, para 16-41
TA 118375

Figure 28-3 (Sheet 2 of 2)

Symptom 4

PLATFORM DOES NOT OPEN, OR CLOSE, ALL THE WAY

1

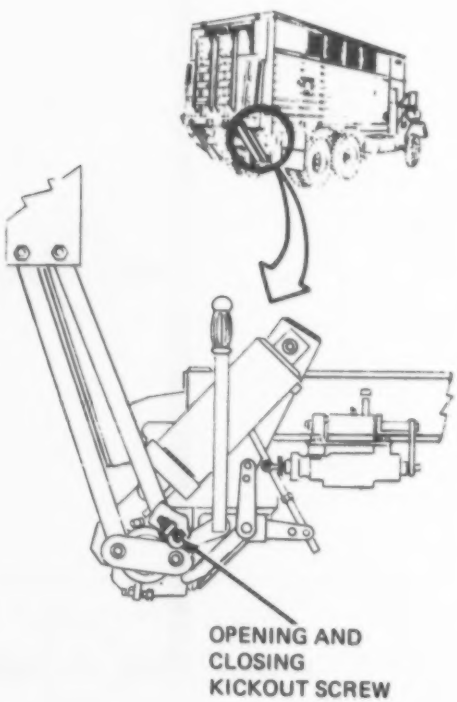
- Make truck ready for work on tailgate
  - Park truck. Refer to TM 9-2320-260-10

2

- Check opening and closing trips
  - Look for a bent or broken screw

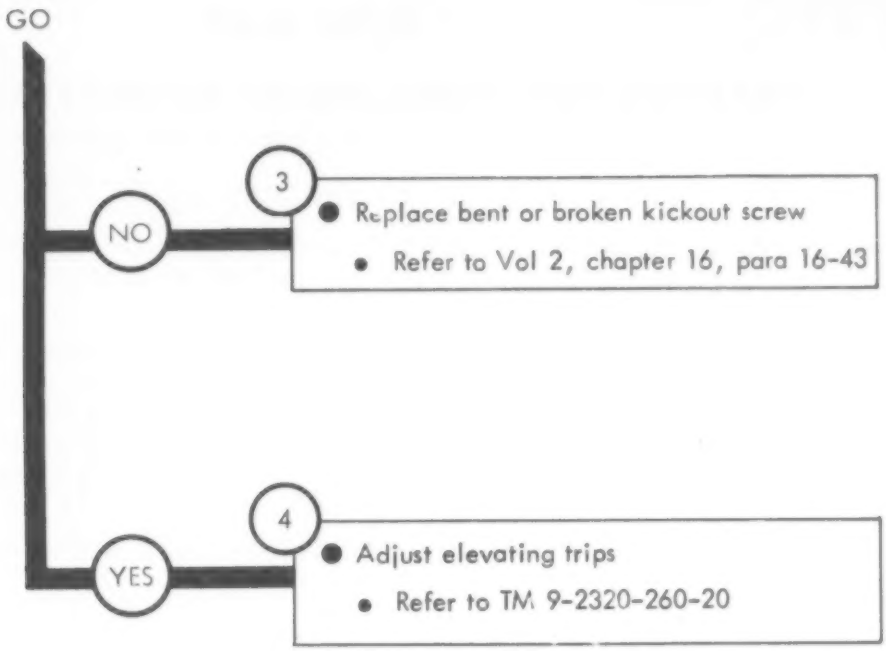
Is screw OK?

GO



TA 118376

Figure 28-4 (Sheet 1 of 2)



TA 118377

Figure 28-4 (Sheet 2 of 2)

CHAPTER 29

VAN TAILGATE SYSTEM TROUBLESHOOTING SUMMARY

29-1. GENERAL. This chapter gives a summary of troubleshooting procedures given in chapter 28, for the Van Tailgate System.

29-2. PROCEDURES. The summary in this chapter covers all fault symptoms found in the detailed troubleshooting procedures. Chapter 7 outlines a sample troubleshooting procedure. The summary procedures are based on the "what-to-do" portions of the detailed procedures and do not include the "how-to-do-it" instructions. Warnings, cautions, and notes are given where needed.

VAN TAILGATE SYSTEM TROUBLESHOOTING SUMMARY

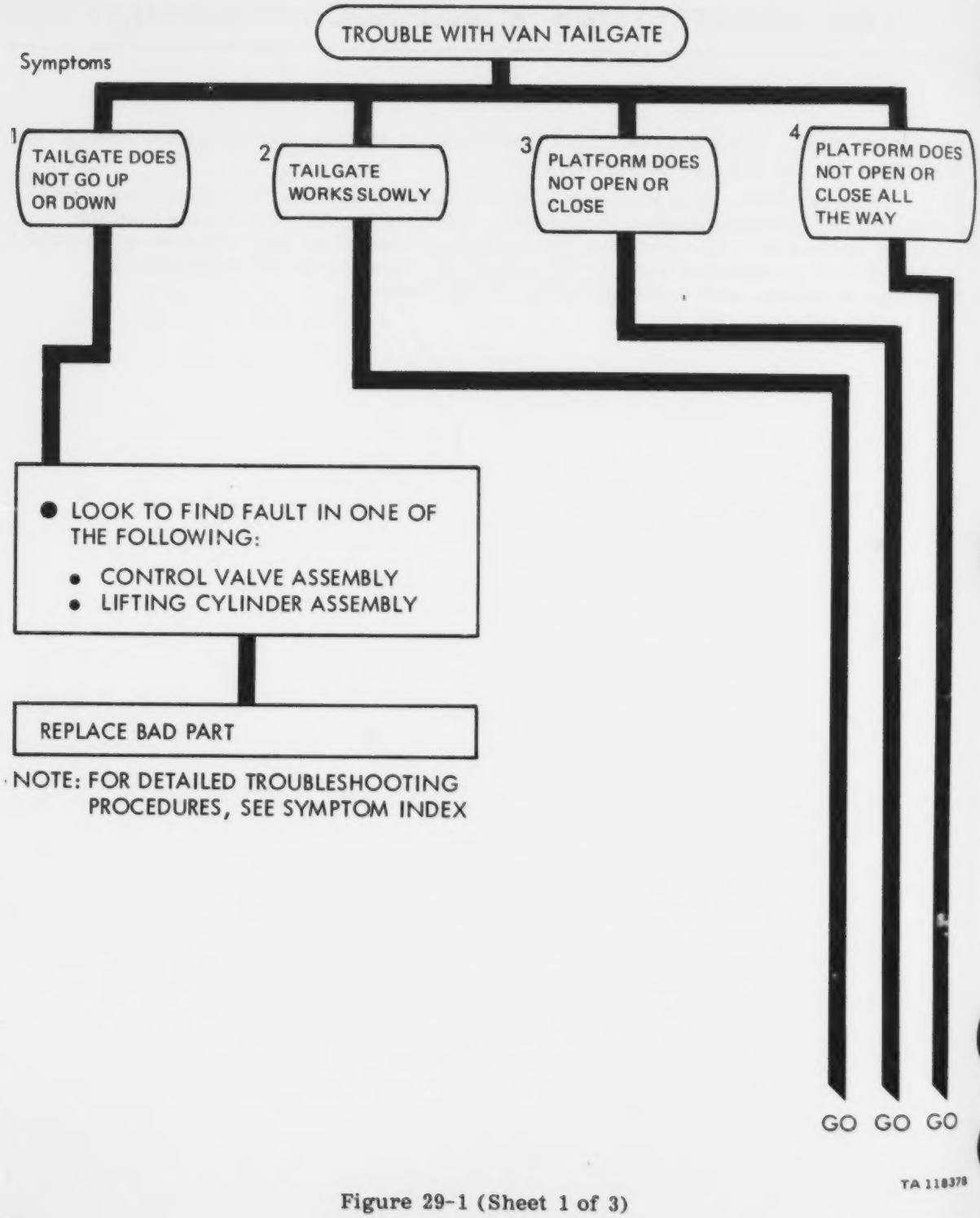

TROUBLE WITH VAN TAILGATE
Symptoms
1
TAILGATE DOES NOT GO UP OR DOWN
2
TAILGATE WORKS SLOWLY
3
PLATFORM DOES NOT OPEN OR CLOSE
4
PLATFORM DOES NOT OPEN OR CLOSE ALL THE WAY
● LOOK TO FIND FAULT IN ONE OF THE FOLLOWING:
• CONTROL VALVE ASSEMBLY
• LIFTING CYLINDER ASSEMBLY
REPLACE BAD PART
NOTE: FOR DETAILED TROUBLESHOOTING PROCEDURES, SEE SYMPTOM INDEX
GO GO GO
TA 118378

Figure 29-1 (Sheet 1 of 3)

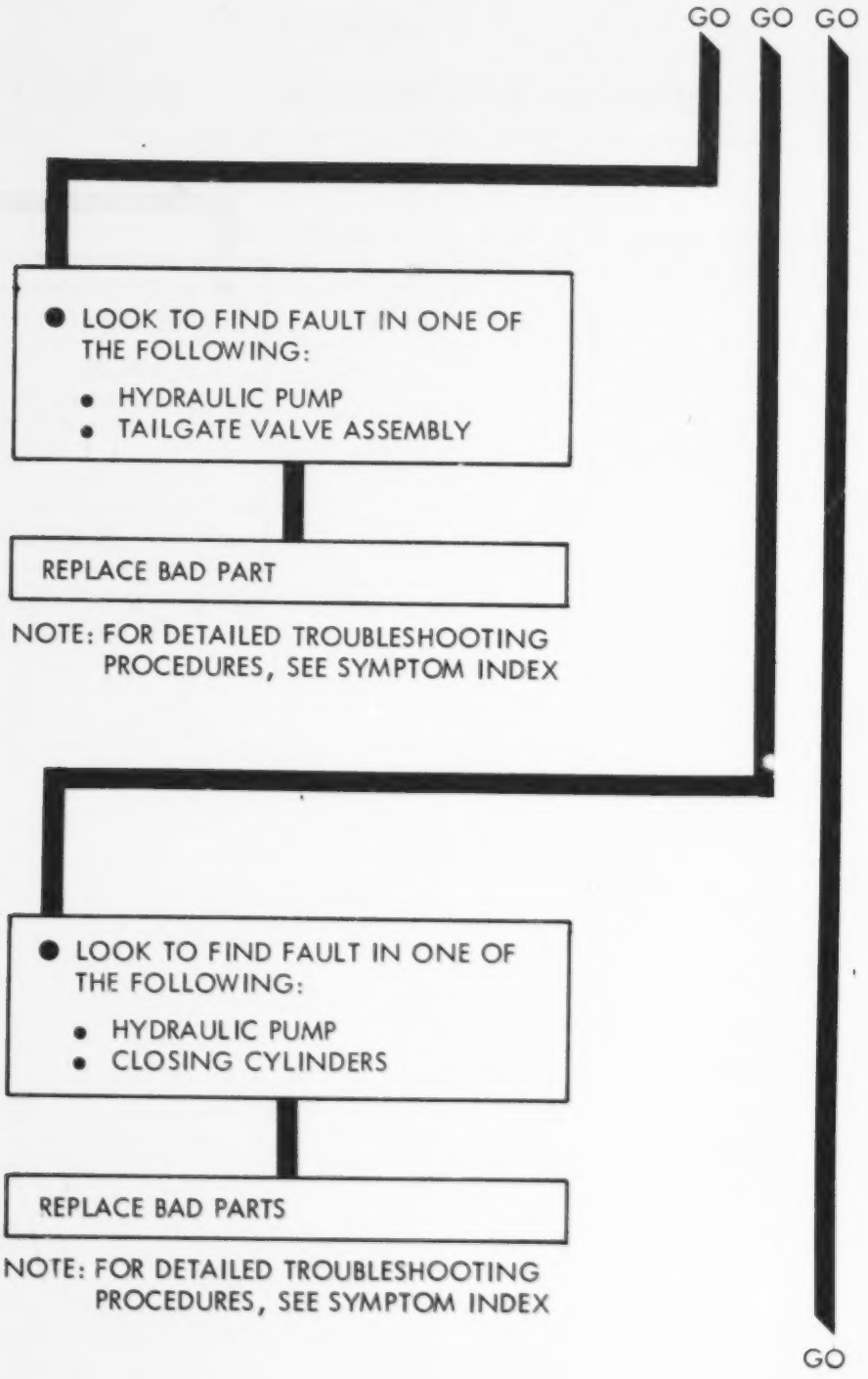
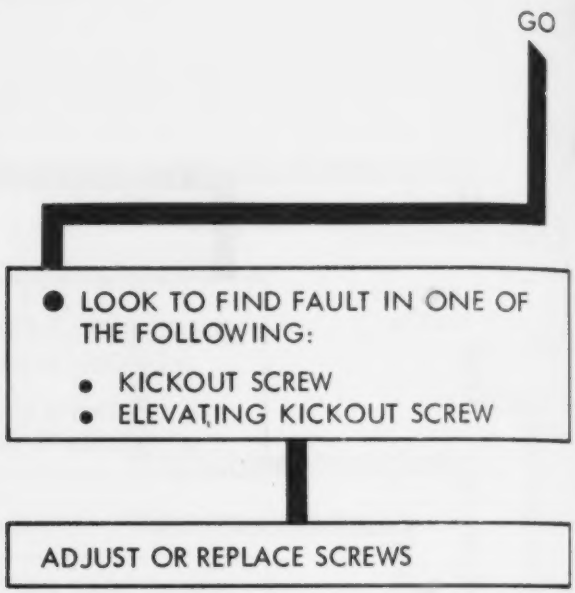

GO GO GO
● LOOK TO FIND FAULT IN ONE OF THE FOLLOWING:
• HYDRAULIC PUMP
• TAILGATE VALVE ASSEMBLY
REPLACE BAD PART
NOTE: FOR DETAILED TROUBLESHOOTING PROCEDURES, SEE SYMPTOM INDEX
● LOOK TO FIND FAULT IN ONE OF THE FOLLOWING:
• HYDRAULIC PUMP
• CLOSING CYLINDERS
REPLACE BAD PARTS
NOTE: FOR DETAILED TROUBLESHOOTING PROCEDURES, SEE SYMPTOM INDEX
GO
TA 118379

Figure 29-1 (Sheet 2 of 3)


GO
● LOOK TO FIND FAULT IN ONE OF THE FOLLOWING:
• KICKOUT SCREW
• ELEVATING KICKOUT SCREW
ADJUST OR REPLACE SCREWS
NOTE: FOR DETAILED TROUBLESHOOTING PROCEDURES, SEE SYMPTOM INDEX

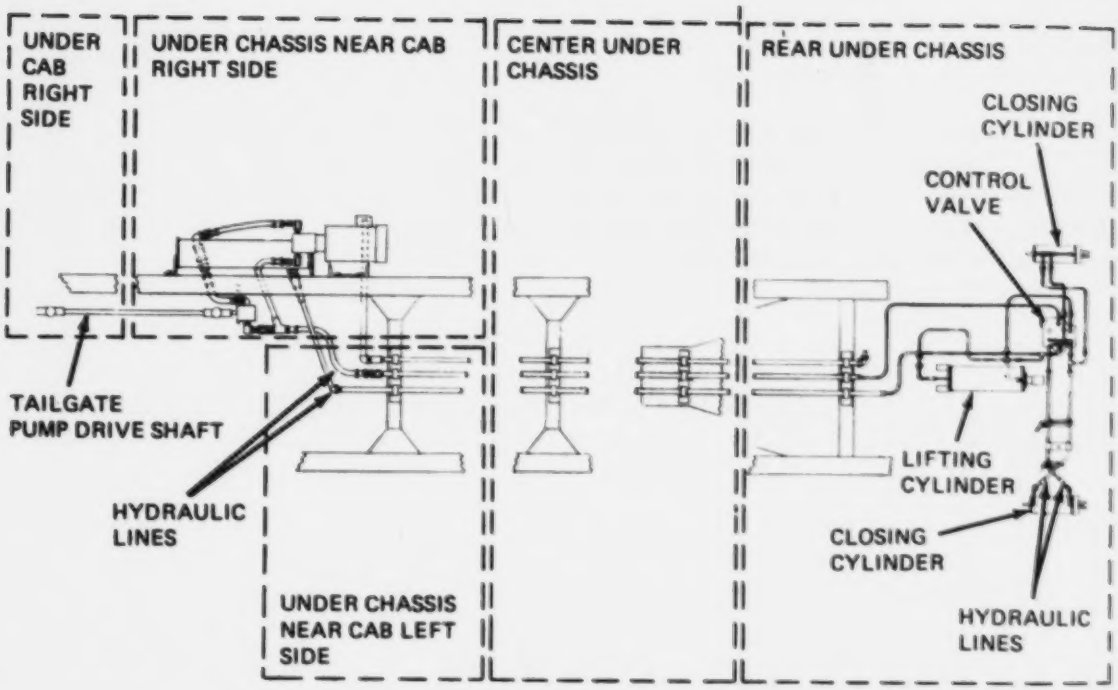
TA 118380

Figure 29-1 (Sheet 3 of 3)

CHAPTER 30

VAN TAILGATE SYSTEM SUPPORT DIAGRAMS

30-1. GENERAL. This chapter gives the diagrams you need when doing trouble-shooting procedures in chapter 28. Figure 3-1 is a complete listing of all support diagrams used in this manual.



TA 118381

Figure 30-1. Van Tailgate Hydraulic Lines

CHAPTER 31

VAN TAILGATE SYSTEM TEST PROCEDURES

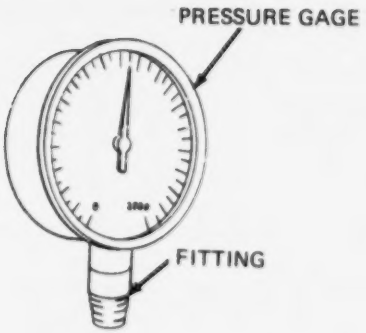
31-1. GENERAL. This chapter gives test procedures for the tests given in chapter 28, for the Van Tailgate System.

31-2. TEST SET-UP. Instructions for setup of test equipment and parts to be tested are given before the test procedures. Illustrations are used, when needed, to show you how to hook up the test equipment to the part to be tested.

31-3. TEST PROCEDURE. Detailed step-by-step instructions, in flow chart form, are given for each test. The procedure calls out the type of test and the condition of the truck system for each part of testing. The step-by-step test will lead you to the bad component or to a fault symptom within a related system. Reference is made to the fault symptom index, chapter 6, if the test shows a fault in another system.

GENERAL INSTRUCTIONS

- Check pressure gage before using
  - Gage - make sure that glass and needle are not broken
  - Fitting - make sure fitting is tight on gage. See if fitting end is dirt free



1 EXPANSIBLE VAN TAILGATE HYDRAULIC PUMP AND AC MOTOR PUMP PRESSURE TEST - To check output pressure from hydraulic and AC motor pumps

GO

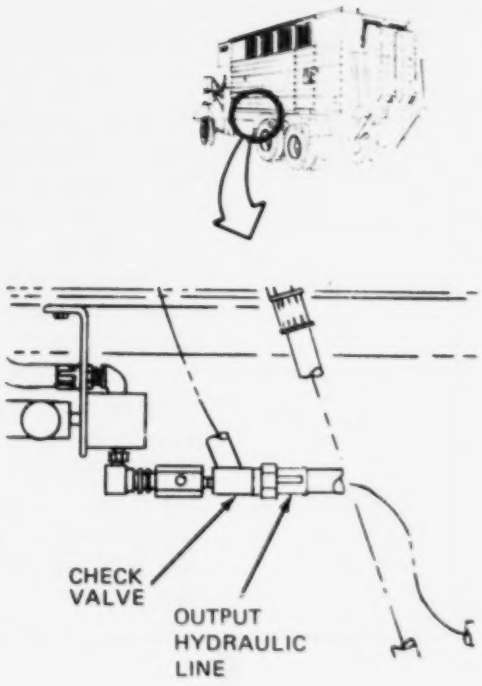
TA 118382

Figure 31-1 (Sheet 1 of 4)

GO

1

- Set up test gage as follows
  - Put a bucket, or can under check valve
  - Using wrench unscrew and take off output hydraulic line from check valve. Put line end in bucket or can
  - Screw in a suitable T-fitting adapter and tighten using wrench
  - Screw in test gage and tighten using wrench
  - Screw hydraulic line onto T-fitting and tighten using wrench. Fill tailgage reservoir. Refer to LO 9-2320-260-12



NOTE

This next step will need the use of two soldiers. The lead soldier will be called Soldier A, and his helper will be called Soldier B.

GO

TA 116383

Figure 31-1 (Sheet 2 of 4)

GO

2

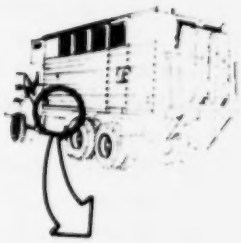
- Test hydraulic and AC motor pumps pressure

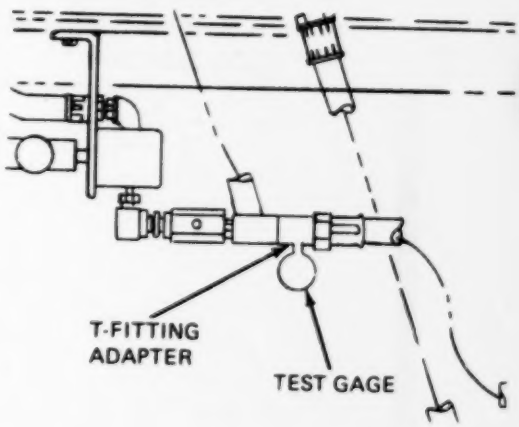
SOLDIER B:
- Go to drivers seat and wait for instructions from Soldier A

SOLDIER A:
- Crawl under truck and look at gage
- Tell Soldier B to start engine and operate hydraulic pump

SOLDIER B:
- Start engine and operate tailgate using hydraulic pump. Refer to TM 9-2320-260-10

SOLDIER A:
- See if pressure gage reads between 1400 and 1600 pounds per square inch





SOLDIER A:
- Tell Soldier B to operate AC motor-pump

SOLDIER B:
- Operate tailgate using AC motor-pump. Refer to TM 9-2320-260-10

SOLDIER A:
- See if pressure gage reads between 1400 and 1600 pounds per square inch

GO

TA 118384

Figure 31-1 (Sheet 3 of 4)

GO

3

- Take out test gage
  - Using wrench unscrew and take off hydraulic line from T-fitting adapter. Put end in bucket or can
  - Using wrench unscrew and take out test gage
  - Using wrench unscrew and take out T-fitting adapter
  - Put hydraulic line on check valve and tighten using wrench

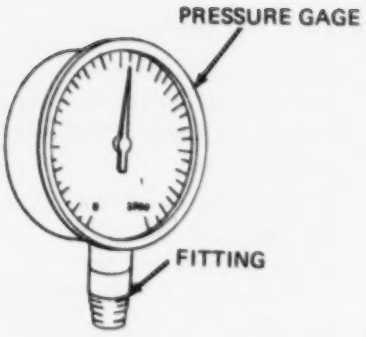
  Note: If pressure readings are OK, top off hydraulic oil reservoir. Refer to LO 9-2320-260-12

TA 118385

Figure 31-1 (Sheet 4 of 4)

GENERAL INSTRUCTIONS

- Check pressure gage before using
  - Gage - make sure that glass and needle are not broken
  - Fitting - make sure fitting is tight on gage. See if fitting end is dirt free



2

LIFTING CYLINDER PRESSURE TEST - To check output pressure from control valve assembly to lifting cylinder

GO

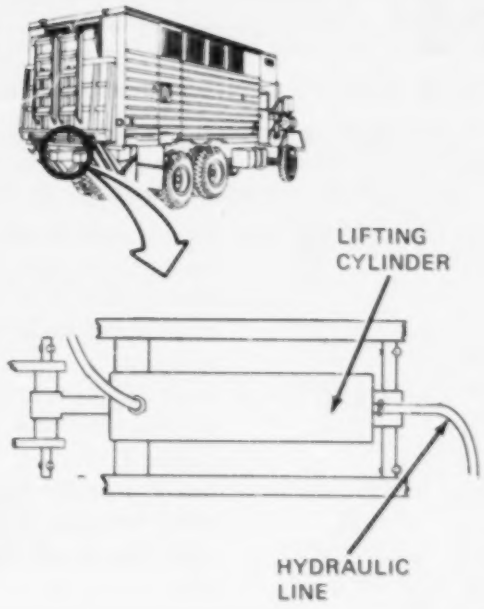
TA 118386

Figure 31-2 (Sheet 1 of 3)

GO

1

- Set up test gage as follows:
  - Put a bucket or can under lifting cylinder. See fig. 30-1
  - Using 11/16-inch wrench unscrew and take off output hydraulic line to lifting cylinder
  - Put line end in bucket or can
  - Screw in a suitable T-fitting adapter and tighten using 11/16-inch wrench
  - Screw in test gage and tighten using 5/8-inch wrench
  - Screw hydraulic line onto T-fitting and tighten using 11/16-inch wrench. Fill tailgate reservoir. Refer to LO 9-2320-260-12



NOTE

This next step will need the use of two soldiers. The lead soldier will be called Soldier A, and his helper will be called Soldier B

GO

TA 118387

Figure 31-2 (Sheet 2 of 3)

GO

2

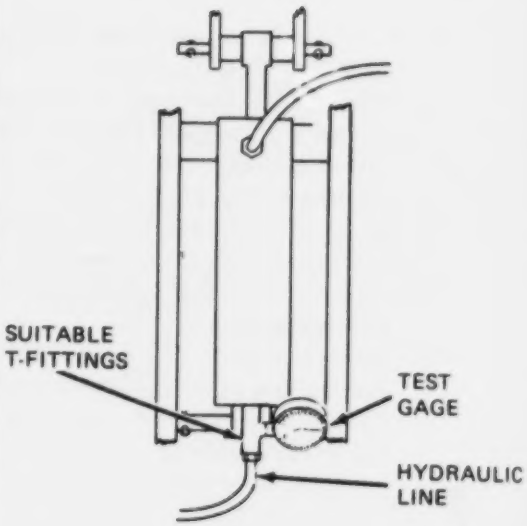
- Test lifting cylinder pressure as follows

SOLDIER B:
- Go to drivers seat and wait for instructions from Soldier A

SOLDIER A:
- Crawl under truck and look at test gage
- Tell Soldier B to start engine and raise or lower tailgate

SOLDIER B:
- Start engine and raise or lower tailgate. See figure 31-1

SOLDIER A:
- See if pressure gage reads between 1100 and 1300 pounds per square inch



3

- Take out test gage
  - Using 11/16-inch wrench unscrew and take off hydraulic line from T-fitting adapter. Put end in bucket or can
  - Using 11/16-inch wrench unscrew and take out test gage
  - Using 5/8-inch wrench unscrew and take out T-fitting adapter
  - Put hydraulic line on lift cylinder and tighten using 11/16-inch wrench

TA 118388

Figure 31-2 (Sheet 3 of 3)

CHAPTER 32

VAN TAILGATE SYSTEM CHECKOUT PROCEDURES

32-1. GENERAL. This chapter gives procedures for checking out the system after troubleshooting and repair have been done. Procedures are set up in flow chart form showing the checkout steps in order and referring to the fault symptom index when the system does not check out.

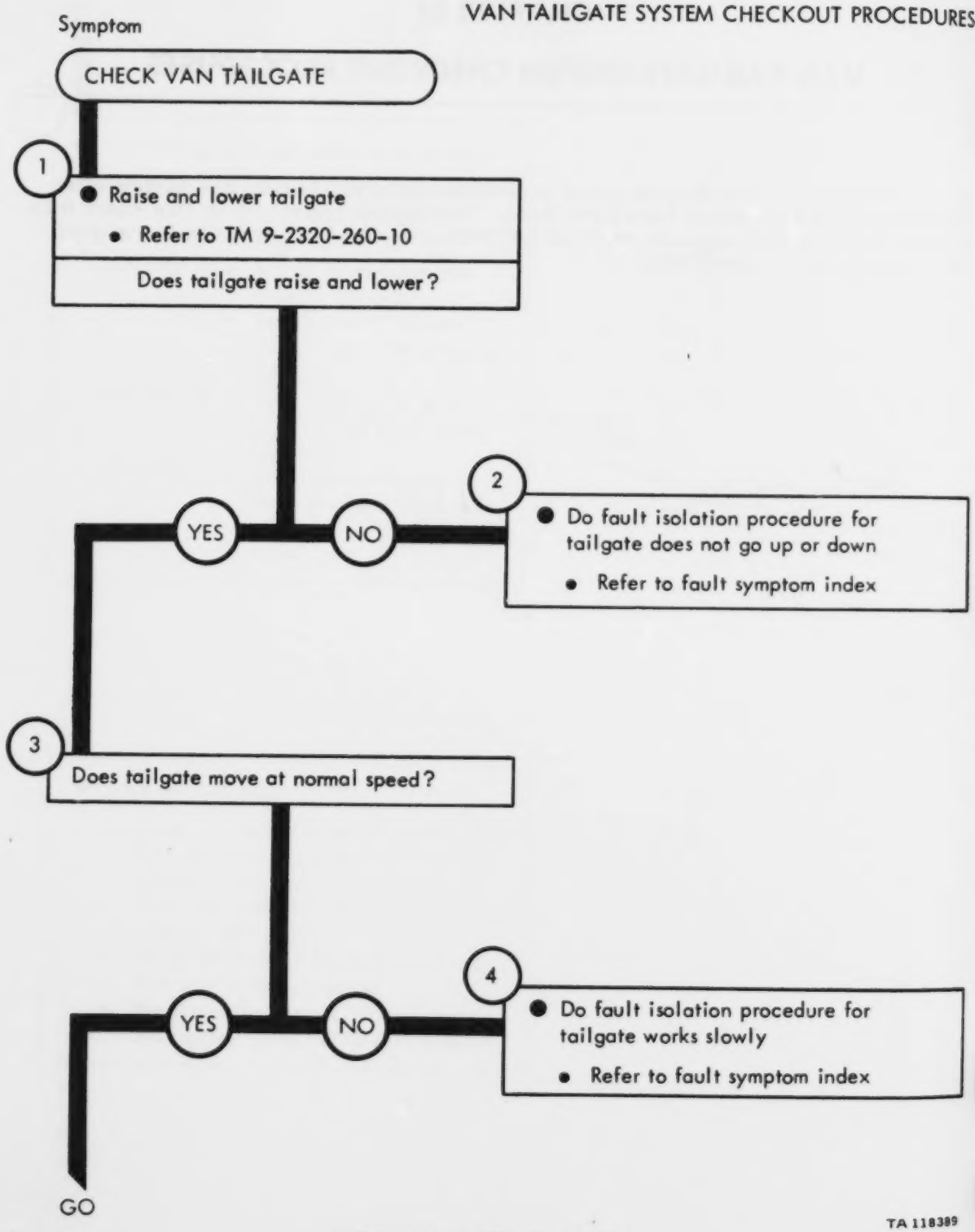
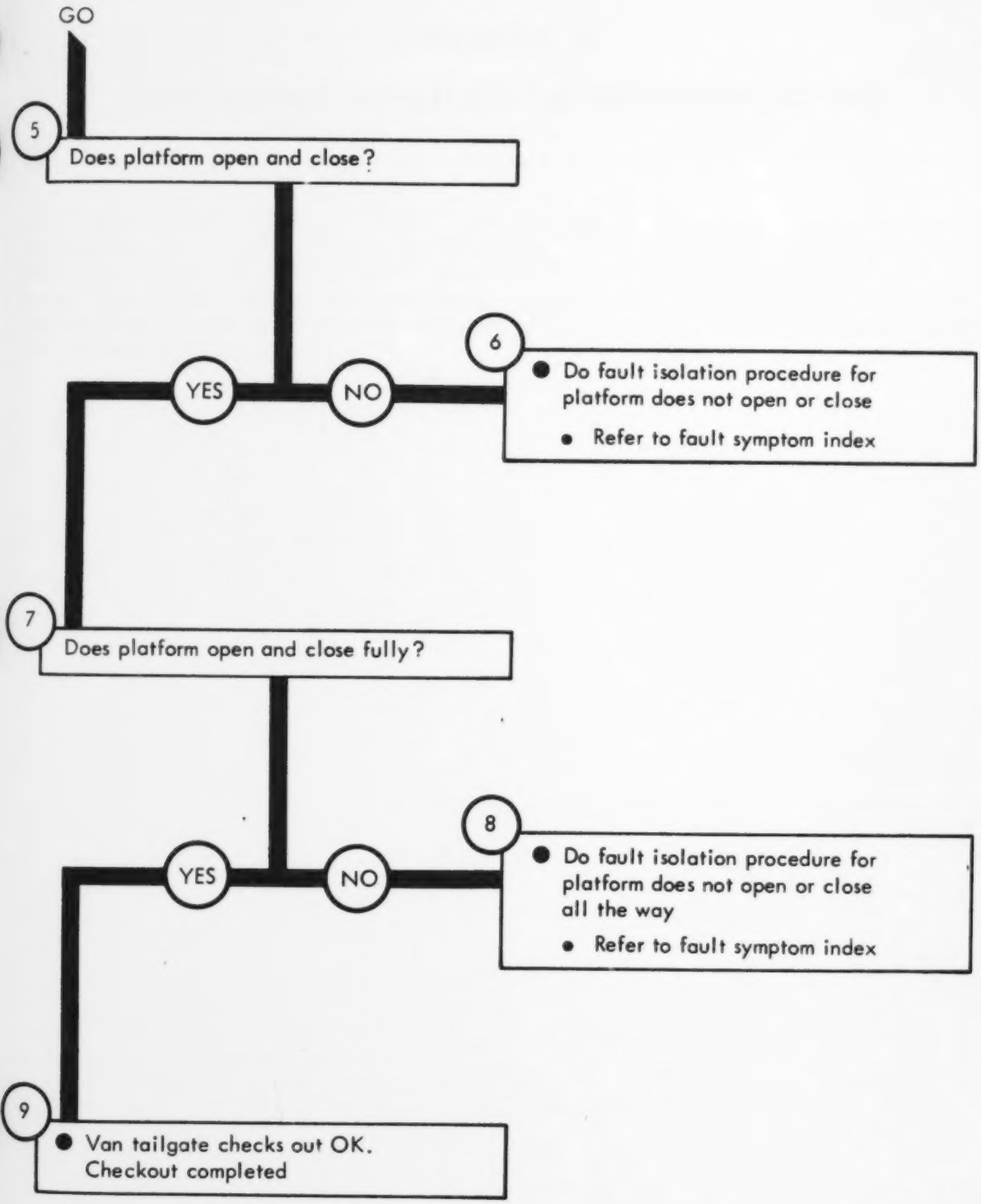


Figure 32-1 (Sheet 1 of 2)


GO
5
Does platform open and close?
YES
NO
6
● Do fault isolation procedure for platform does not open or close
• Refer to fault symptom index
7
Does platform open and close fully?
YES
NO
8
● Do fault isolation procedure for platform does not open or close all the way
• Refer to fault symptom index
9
● Van tailgate checks out OK. Checkout completed

TA 118390

Figure 32-1 (Sheet 2 of 2)

CHAPTER 33

M815 MIDSHIP WINCH SYSTEM TROUBLESHOOTING

33-1. EQUIPMENT ITEMS COVERED. This chapter gives equipment troubleshooting procedures for the M815 Midship Winch for which there are authorized corrective maintenance tasks at direct support and general support level of maintenance.

33-2. EQUIPMENT ITEMS NOT COVERED. All equipment items for which corrective maintenance is authorized at direct support and general support level of maintenance are covered in this chapter.

M815 MIDSHIP WINCH SYSTEM TROUBLESHOOTING

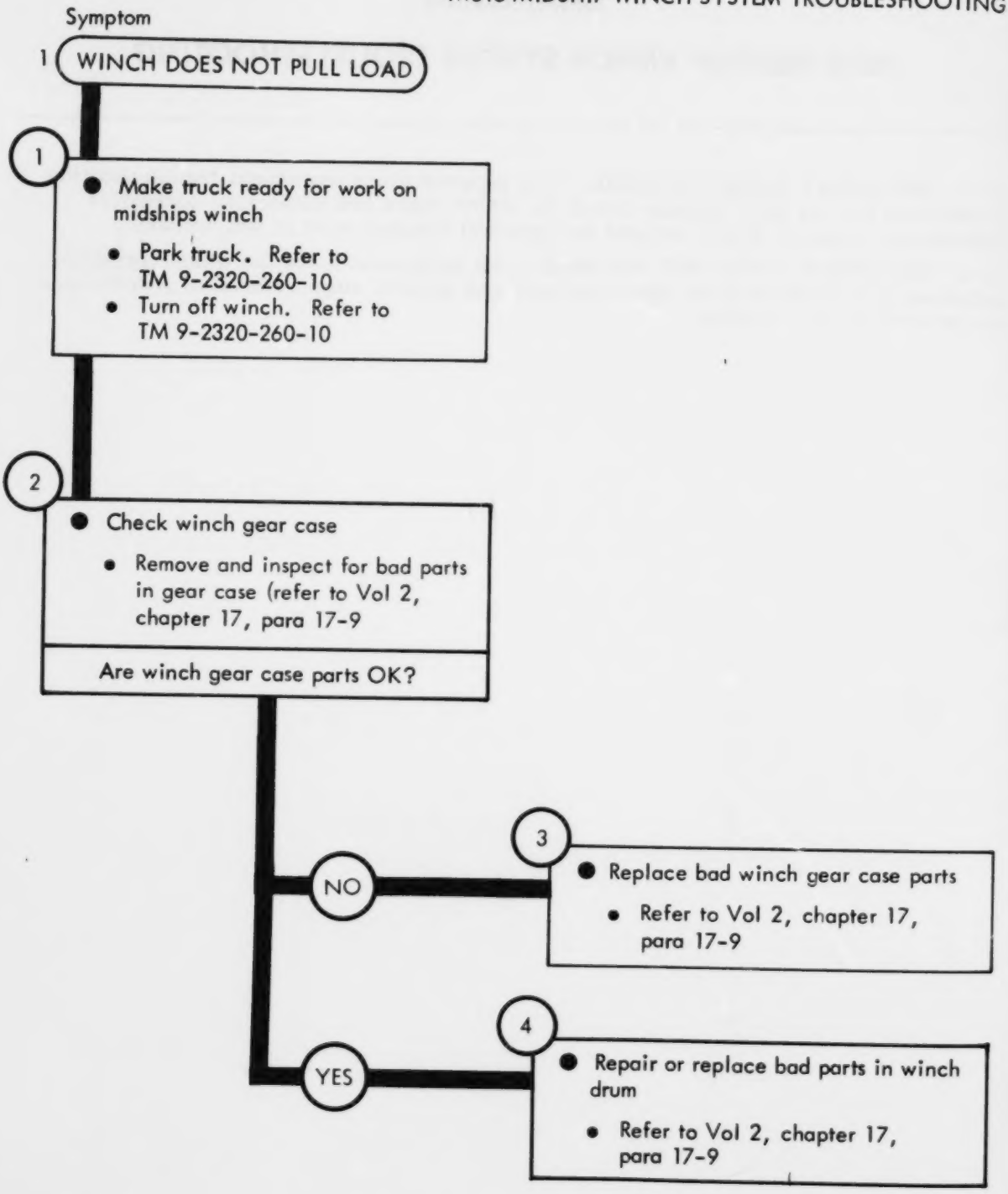

Symptom
1
WINCH DOES NOT PULL LOAD
1
Make truck ready for work on midships winch
Park truck. Refer to TM 9-2320-260-10
Turn off winch. Refer to TM 9-2320-260-10
2
Check winch gear case
Remove and inspect for bad parts in gear case (refer to Vol 2, chapter 17, para 17-9
Are winch gear case parts OK?
NO
3
Replace bad winch gear case parts
Refer to Vol 2, chapter 17, para 17-9
YES
4
Repair or replace bad parts in winch drum
Refer to Vol 2, chapter 17, para 17-9
TA 118391

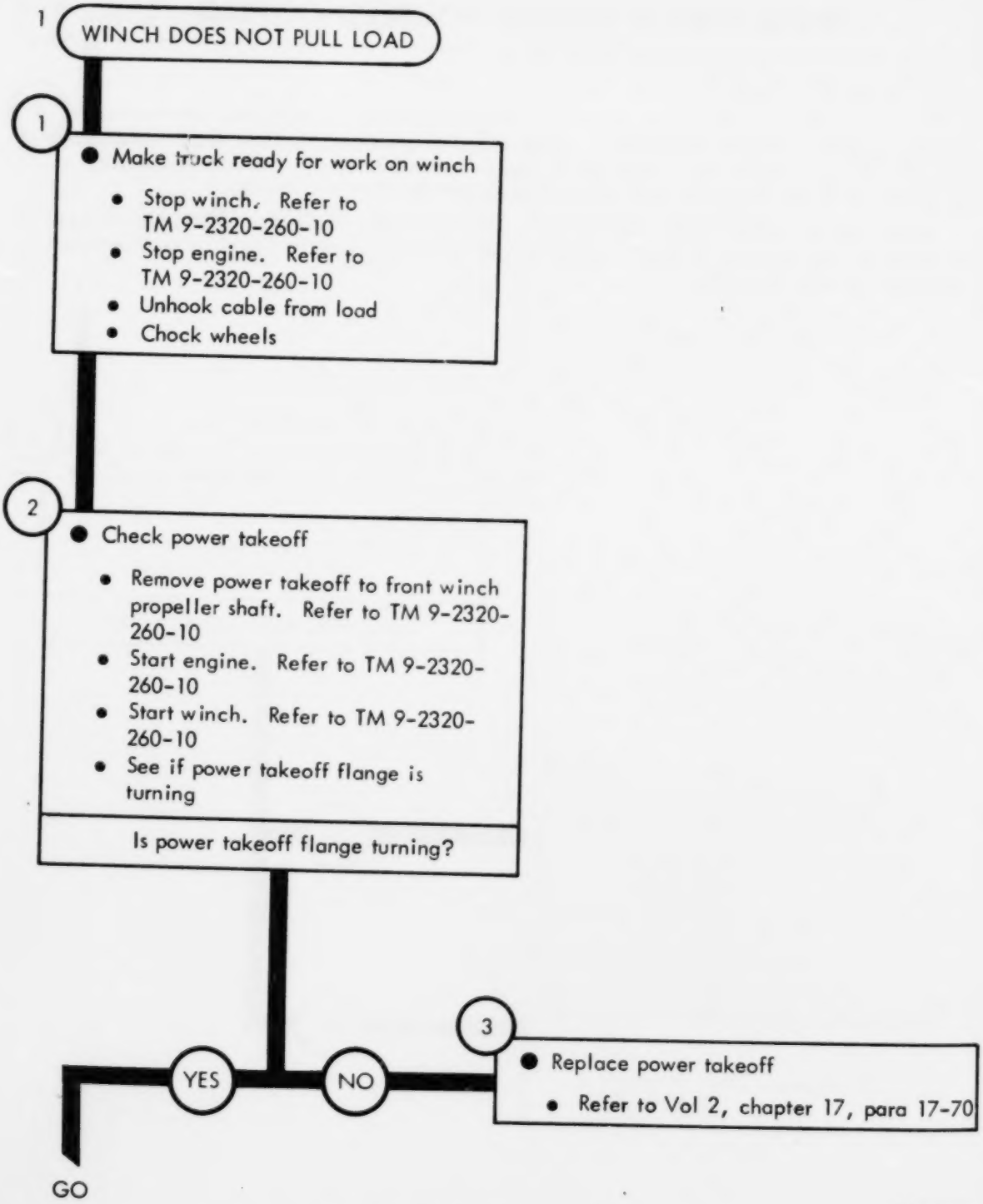
Figure 33-1

CHAPTER 34

FRONT WINCH SYSTEM TROUBLESHOOTING

34-1. EQUIPMENT ITEMS COVERED. This chapter gives equipment troubleshooting procedures for the Front Winch for which there are authorized corrective maintenance tasks at direct support and general support level of maintenance.

34-2. EQUIPMENT ITEMS NOT COVERED. All equipment items for which corrective maintenance is authorized at direct support and general support level of maintenance are covered in this chapter.


1
WINCH DOES NOT PULL LOAD
1
Make truck ready for work on winch
Stop winch. Refer to TM 9-2320-260-10
Stop engine. Refer to TM 9-2320-260-10
Unhook cable from load
Chock wheels
2
Check power takeoff
Remove power takeoff to front winch propeller shaft. Refer to TM 9-2320-260-10
Start engine. Refer to TM 9-2320-260-10
Start winch. Refer to TM 9-2320-260-10
See if power takeoff flange is turning
Is power takeoff flange turning?
YES
NO
3
Replace power takeoff
Refer to Vol 2, chapter 17, para 17-70
GO

TA 118392

Figure 34-1 (Sheet 1 of 2)

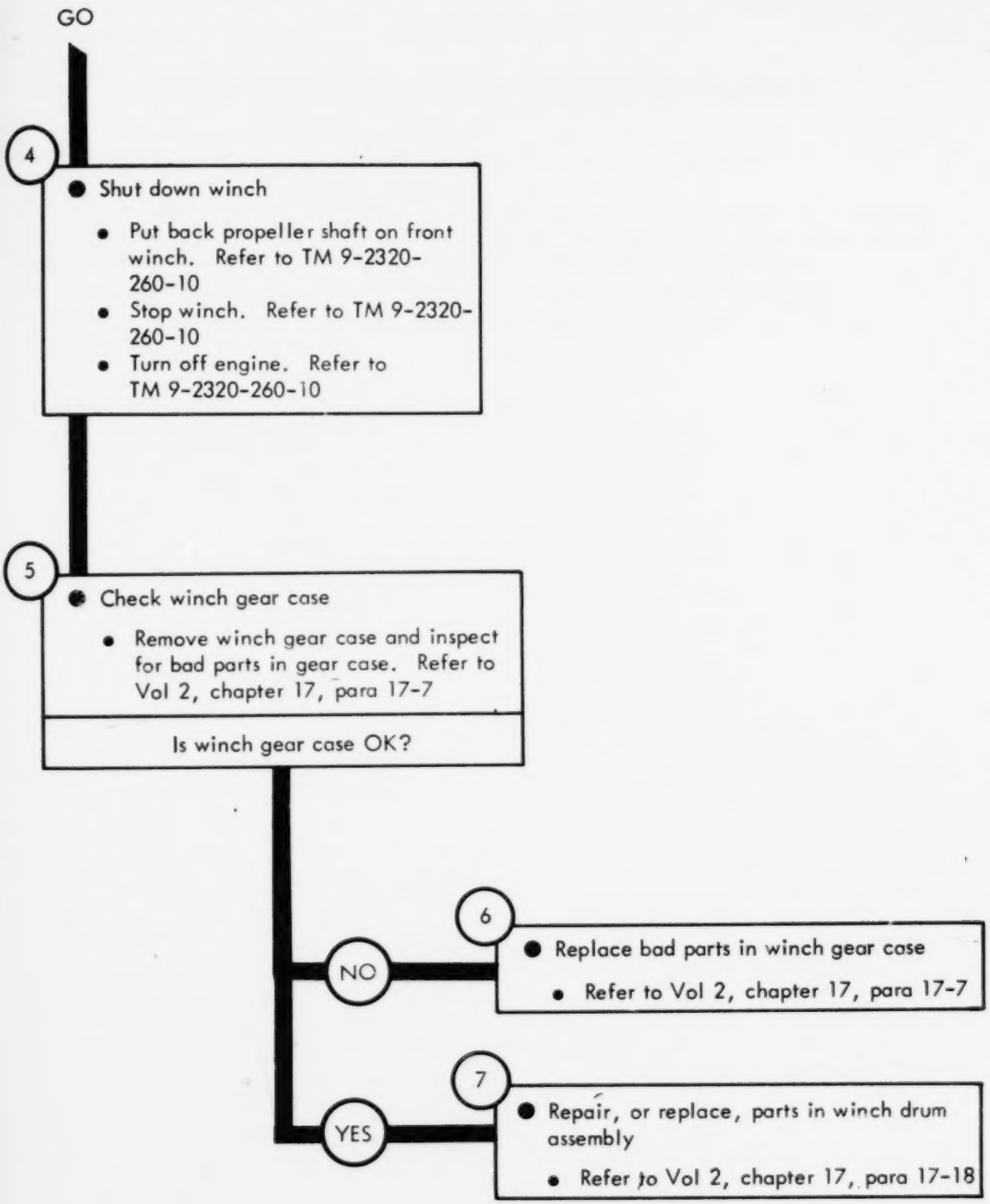

GO
4
Shut down winch
Put back propeller shaft on front winch. Refer to TM 9-2320-260-10
Stop winch. Refer to TM 9-2320-260-10
Turn off engine. Refer to TM 9-2320-260-10
5
Check winch gear case
Remove winch gear case and inspect for bad parts in gear case. Refer to Vol 2, chapter 17, para 17-7
Is winch gear case OK?
NO
6
Replace bad parts in winch gear case
Refer to Vol 2, chapter 17, para 17-7
YES
7
Repair, or replace, parts in winch drum assembly
Refer to Vol 2, chapter 17, para 17-18
TA 118393

Figure 34-1 (Sheet 2 of 2)

CHAPTER 35

M816 WRECKER SYSTEM TROUBLESHOOTING

35-1. EQUIPMENT ITEMS COVERED. This chapter gives equipment troubleshooting procedures for the M816 Wrecker for which there are authorized corrective maintenance tasks at direct support and general support level of maintenance.

35-2. EQUIPMENT ITEMS NOT COVERED. All equipment items for which corrective maintenance is authorized at direct support and general support level of maintenance are covered in this chapter.

Symptom

HOIST WINCH DOES NOT PULL LOAD

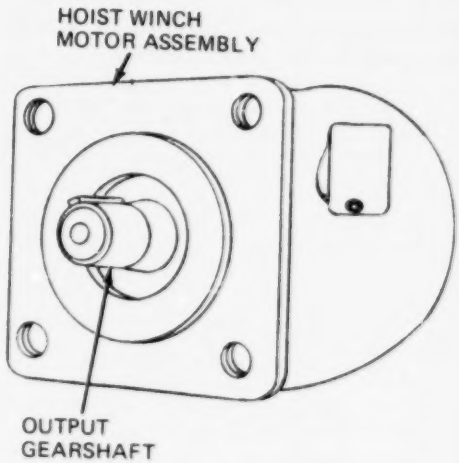
1

- Stop hoist winch operation
  - Turn off hoist winch. Refer to TM 9-2320-260-10
  - Chock wheels

2

- Check hoist winch motor assembly
  - Remove hoist winch motor. Refer to Vol 2, chapter 17, para 17-22
  - Look to see if hoist winch motor output gear shaft is broken
  - Feel for a loose or broken shaft
  - Feel if shaft turns

Is motor OK?



NO

3

- Repair or replace hoist winch motor assembly
  - Refer to Vol 2, chapter 17, para 17-22

YES

NOTE

Before doing next step put back hoist winch motor assembly. Refer to Vol 2, chapter 17, para 17-22

4

- Remove and repair boom hoist winch assembly
  - Refer to Vol 2, chapter 17, para 17-23

TA 118394

Figure 35-1

Symptom 2

HOIST WINCH PULLS LOAD SLOWLY

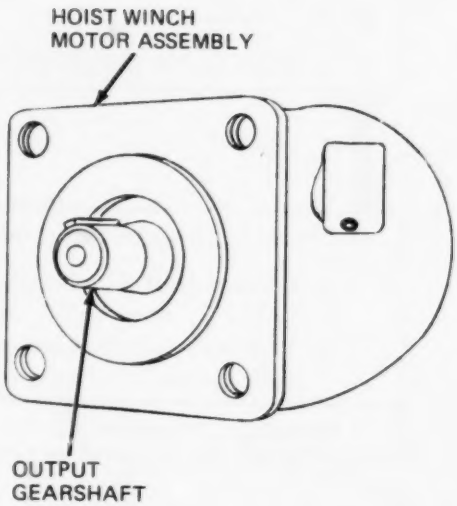
1

- Stop hoist winch operation
  - Turn off hoist winch. Refer to TM 9-2320-260-10
  - Chock wheels

2

- Check hoist winch motor assembly
  - Remove hoist winch motor. Refer to Vol 2, chapter 17, para 17-22
  - Feel for a loose winch motor output gearshaft
  - Feel if shaft turns freely

Is motor OK?



NO

3

- Repair or replace hoist winch motor assembly
  - Refer to Vol 2, chapter 17, para 17-22

YES

NOTE

Before doing next step put back hoist winch motor assembly. Refer to Vol 2, chapter 17, para 17-22

4

- Remove and repair boom hoist winch assembly
  - Refer to Vol 2, chapter 17, para 17-23

TA 118395

Figure 35-2

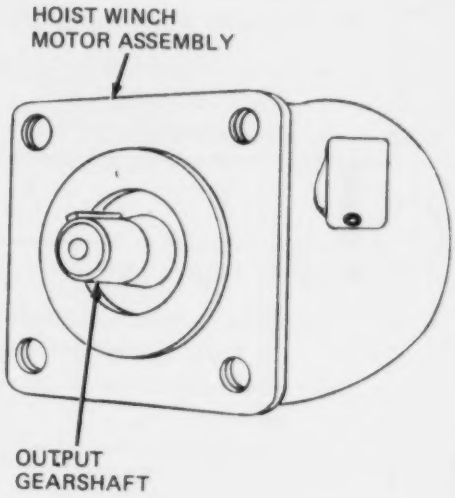
3 Symptom

JERKY OPERATION AS HOIST WINCH PULLS LOAD

1
- Park truck
  - Refer to TM 9-2320-260-10

2
- Check hoist winch motor assembly
  - Remove hoist winch motor. Refer to Vol 2, chapter 17, para 17-22
  - Turn hoist winch motor output gear shaft to feel if it turns freely

Is motor OK?



NO

3
- Repair or replace hoist winch motor assembly
  - Refer to Vol 2, chapter 17, para 17-22

YES

NOTE

Before doing next step put back hoist winch motor assembly. Refer to Vol 2, chapter 17, para 17-22

4
- Remove and repair boom hoist winch assembly
  - Refer to Vol 2, chapter 17, para 17-23

TA 118396

Figure 35-3

4 Symptom

THROTTLE CONTROL LEVER DOES NOT RAISE ENGINE SPEED

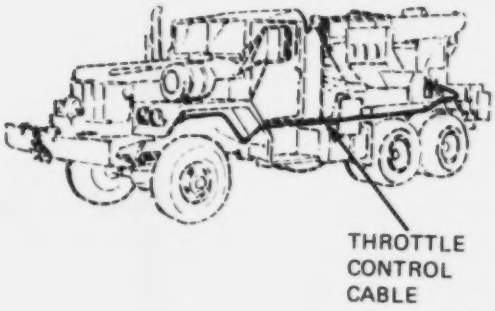
1

- Make truck ready for work on wrecker
  - Park truck. Refer to TM 9-2320-260-10
  - Chock wheels

2

- Check throttle control cable
  - Look for a bent or kinked cable
  - Look for a broken cable

Is cable OK?



YES

NO

3

- Replace bent or crushed cable assembly
  - Refer to TM 9-2320-260-20

GO

TA 118397

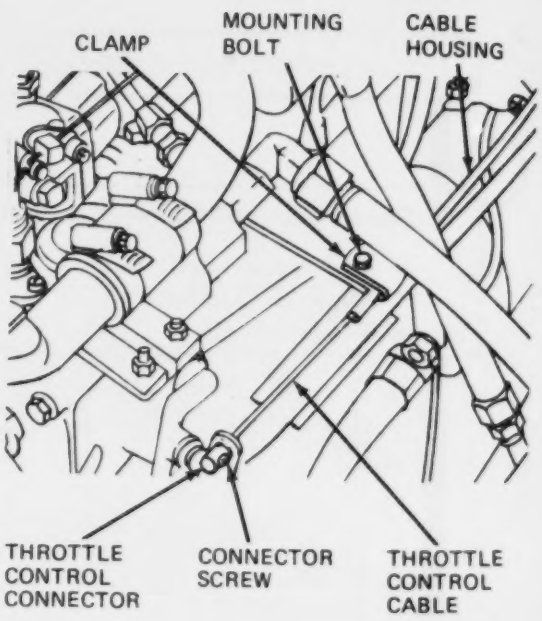
Figure 35-4 (Sheet 1 of 2)

GO

4

- Check throttle control connector and clamp
  - Feel for a loose clamp
  - Pull cable housing back and forth to see if housing slides inside clamp
  - Look for a missing connector
  - Feel for a loose connector screw
  - See if connector slides on cable core

Is throttle control connector OK?



NO

5

- Tighten loose clamp
  - Using 5/8-inch wrench tighten mounting bolt
- Tighten loose connector screw
  - Using screw driver tighten screw
- Replace missing connector
  - Refer to Vol 2, chapter 17, para 17-69

YES

6

- Replace throttle control cable
  - Refer to Vol 2, chapter 17, para 17-69

TA 118398

Figure 35-4 (Sheet 2 of 2)

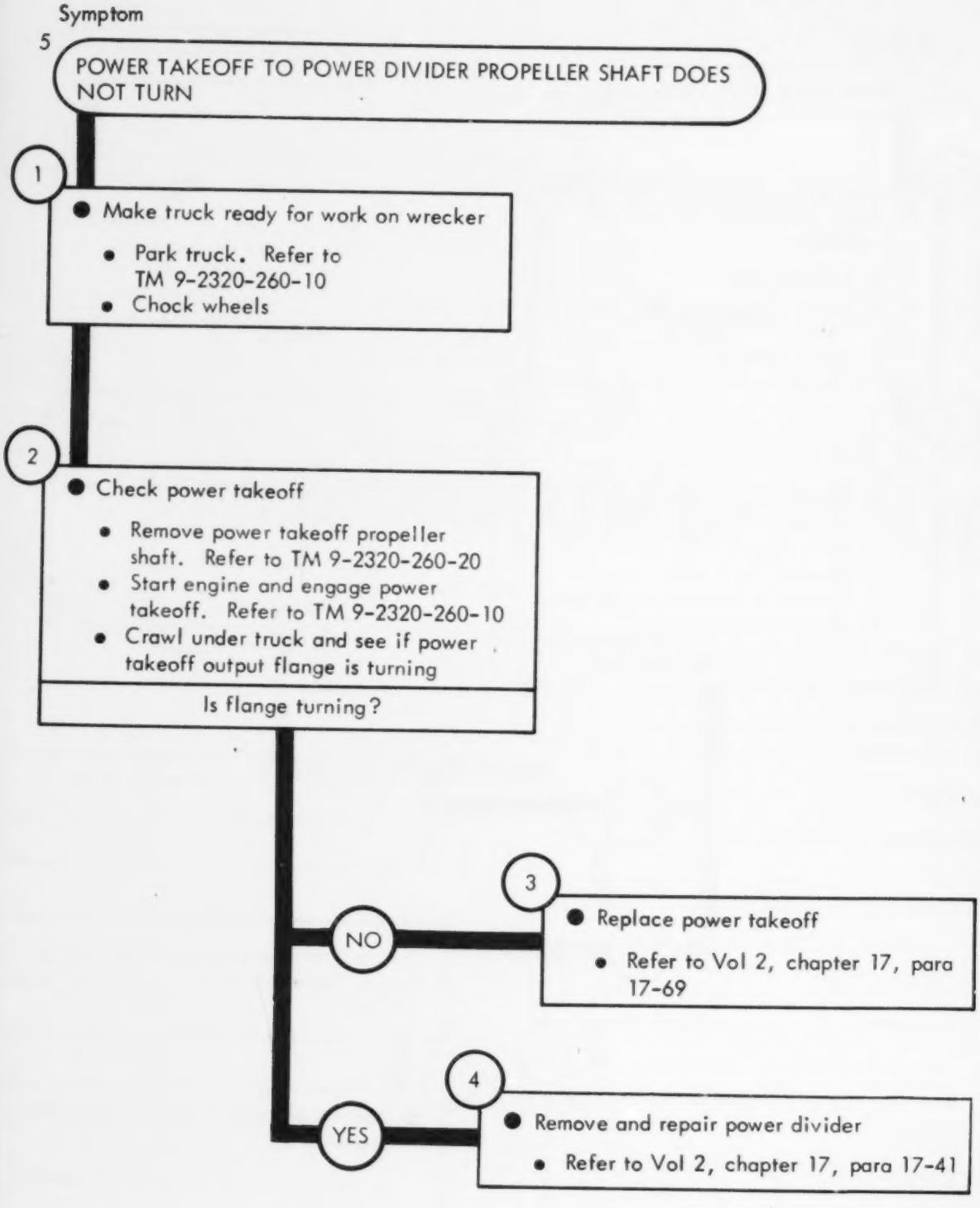

Symptom
5
POWER TAKEOFF TO POWER DIVIDER PROPELLER SHAFT DOES NOT TURN
1
Make truck ready for work on wrecker
Park truck. Refer to TM 9-2320-260-10
Chock wheels
2
Check power takeoff
Remove power takeoff propeller shaft. Refer to TM 9-2320-260-20
Start engine and engage power takeoff. Refer to TM 9-2320-260-10
Crawl under truck and see if power takeoff output flange is turning
Is flange turning?
NO
3
Replace power takeoff
Refer to Vol 2, chapter 17, para 17-69
YES
4
Remove and repair power divider
Refer to Vol 2, chapter 17, para 17-41
TA 118399

Figure 35-5

Symptom 6

CRANE DOES NOT SWING

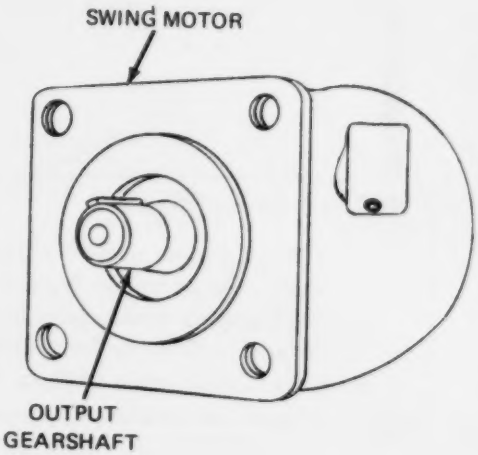
1

- Make truck ready for work on wrecker
  - Remove load
  - Turn off engine. Refer to TM 9-2320-260-10
  - Chock wheels

2

- Check swing motor
  - Remove swing motor. Refer to Vol 2, chapter 17, para 17-26
  - Look to see if swing motor output gearshaft is broken
  - Feel for a loose or broken shaft
  - Feel if shaft turns

Is motor OK?



NO

3

- Repair or replace swing motor
  - Refer to Vol 2, chapter 17, para 17-26

YES

NOTE

Before doing next step put back swing motor. Refer to Vol 2, chapter 17, para 17-26

4

- Remove and repair swinger gear case assembly
  - Refer to Vol 2, chapter 17, para 17-27

TA 118400

Figure 35-6

7 Symptom

CRANE SWINGS SLOWLY

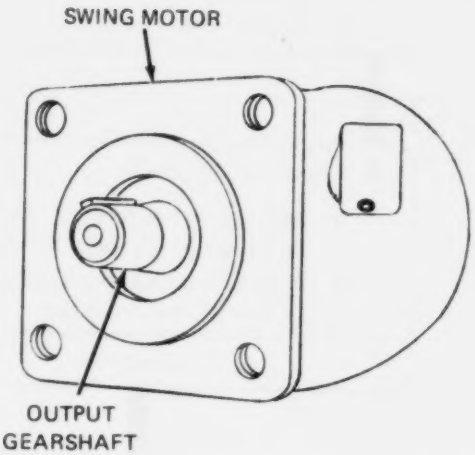
1

- Make truck ready for work on wrecker
  - Remove load
  - Turn off engine. Refer to TM 9-2320-260-10
  - Chock wheels

2

- Check swing motor
  - Remove swing motor. Refer to Vol 2, chapter 17, para 17-26
  - Feel for a loose swing motor output gearshaft
  - Feel if shaft turns freely

Is swing motor OK?



NO

3

- Repair or replace swing motor
  - Refer to Vol 2, chapter 17, para 17-26

NOTE

Before doing next step put back swing motor. Refer to Vol 2, chapter 2, para 17-26

4

- Remove and repair swinger gear case assembly
  - Refer to Vol 2, chapter 17, para 17-27

TA 118401

Figure 35-7

Symptom 8

JERKY OPERATION AS CRANE SWINGS

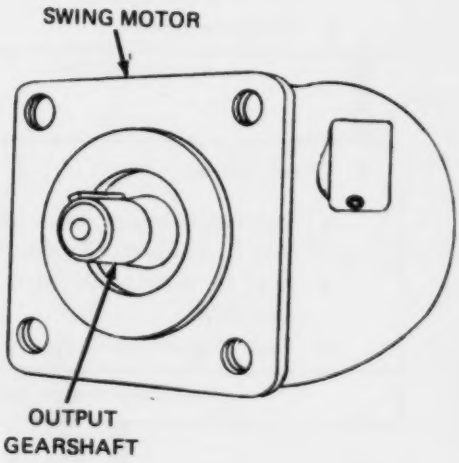
1

- Make truck ready for work on wrecker
  - Remove load
  - Turn off engine. Refer to TM 9-2320-260-10
  - Chock wheels

2

- Check swing motor
  - Remove swing motor. Refer to Vol 2, chapter 17, para 17-26
  - Turn swing motor output gearshaft to feel if it turns freely

Is motor OK?



NO

3

- Repair or replace swing motor
  - Refer to Vol 2, chapter 17, para 17-26

YES

NOTE

Before doing next step put back swing motor. Refer to Vol 2, chapter 17, para 17-26

4

- Remove and repair swinger gear case assembly
  - Refer to Vol 2, chapter 17, para 17-27

TA 118402

Figure 35-8

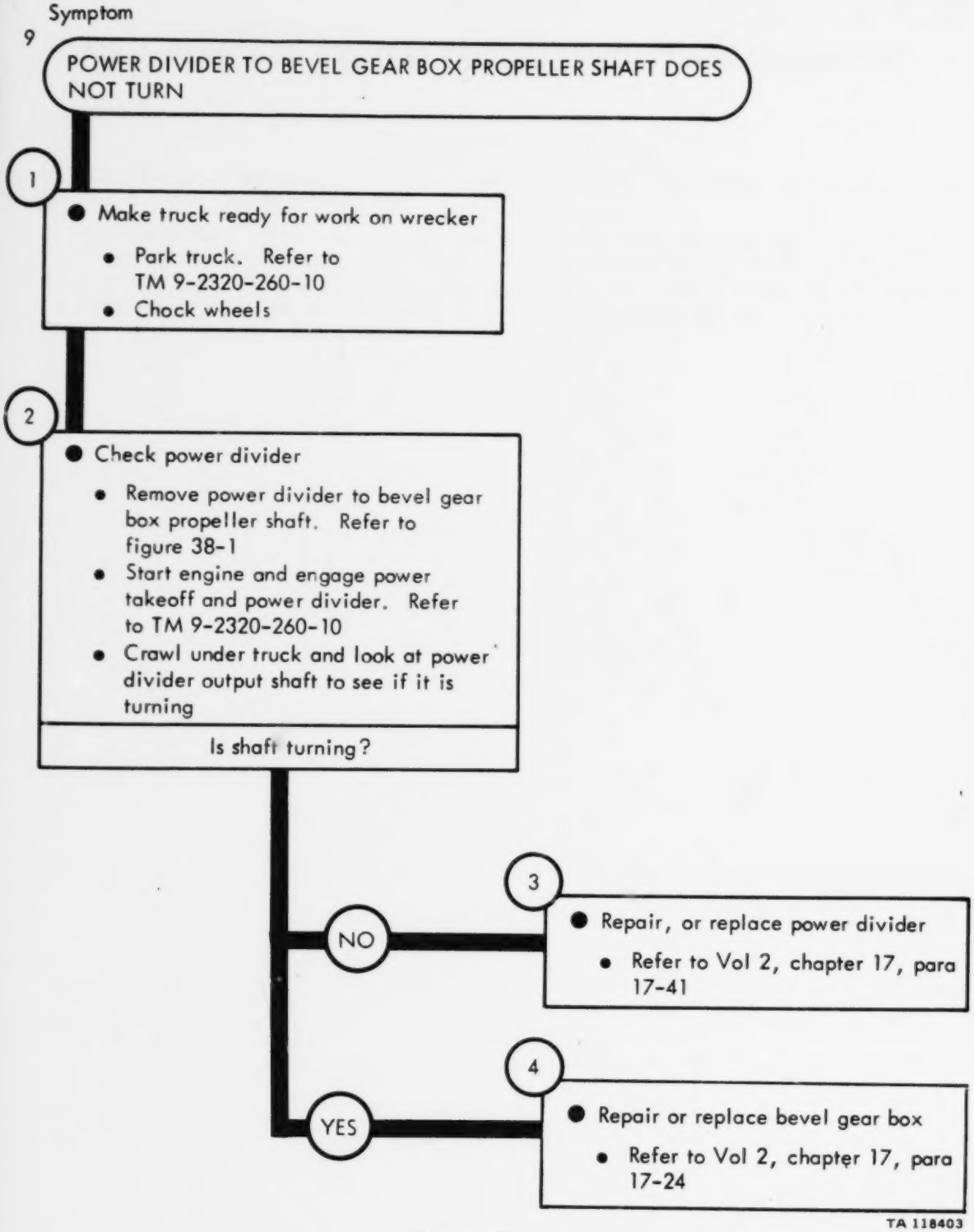

Symptom
9
POWER DIVIDER TO BEVEL GEAR BOX PROPELLER SHAFT DOES NOT TURN
1
● Make truck ready for work on wrecker
• Park truck. Refer to TM 9-2320-260-10
• Chock wheels
2
● Check power divider
• Remove power divider to bevel gear box propeller shaft. Refer to figure 38-1
• Start engine and engage power takeoff and power divider. Refer to TM 9-2320-260-10
• Crawl under truck and look at power divider output shaft to see if it is turning
Is shaft turning?
NO
3
● Repair, or replace power divider
• Refer to Vol 2, chapter 17, para 17-41
YES
4
● Repair or replace bevel gear box
• Refer to Vol 2, chapter 17, para 17-24
TA 118403

Figure 35-9

CHAPTER 36

M816 WRECKER SYSTEM TROUBLESHOOTING SUMMARY

36-1. GENERAL. This chapter gives a summary of troubleshooting procedures given in chapter 35, for the M816 Wrecker.

36-2. PROCEDURES. The summary in this chapter covers all fault symptoms found in the detailed troubleshooting procedures. Chapter 7 outlines a sample trouble-shooting procedure. The summary procedures are based on the "what-to-do" portions of the detailed procedures and do not include the "how-to-do-it" instructions. Warnings, cautions, and notes are given where needed.

M816 WRECKER SYSTEM TROUBLESHOOTING SUMMARY

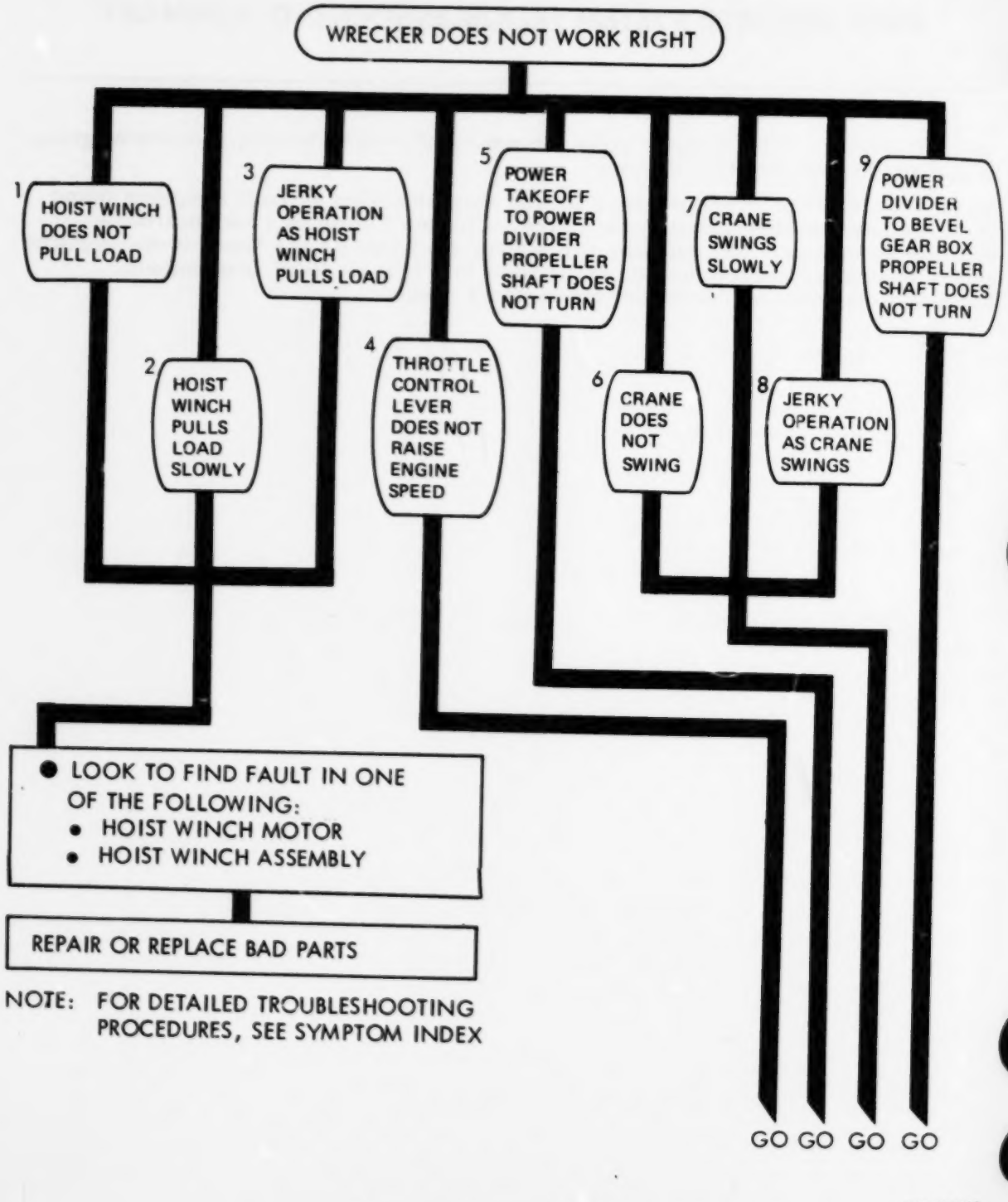

WRECKER DOES NOT WORK RIGHT
1 HOIST WINCH DOES NOT PULL LOAD
2 HOIST WINCH PULLS LOAD SLOWLY
3 JERKY OPERATION AS HOIST WINCH PULLS LOAD
4 THROTTLE CONTROL LEVER DOES NOT RAISE ENGINE SPEED
5 POWER TAKEOFF TO POWER DIVIDER PROPELLER SHAFT DOES NOT TURN
6 CRANE DOES NOT SWING
7 CRANE SWINGS SLOWLY
8 JERKY OPERATION AS CRANE SWINGS
9 POWER DIVIDER TO BEVEL GEAR BOX PROPELLER SHAFT DOES NOT TURN
● LOOK TO FIND FAULT IN ONE OF THE FOLLOWING:
• HOIST WINCH MOTOR
• HOIST WINCH ASSEMBLY
REPAIR OR REPLACE BAD PARTS
NOTE: FOR DETAILED TROUBLESHOOTING PROCEDURES, SEE SYMPTOM INDEX
GO GO GO GO
TA 118404

Figure 36-1 (Sheet 1 of 3)

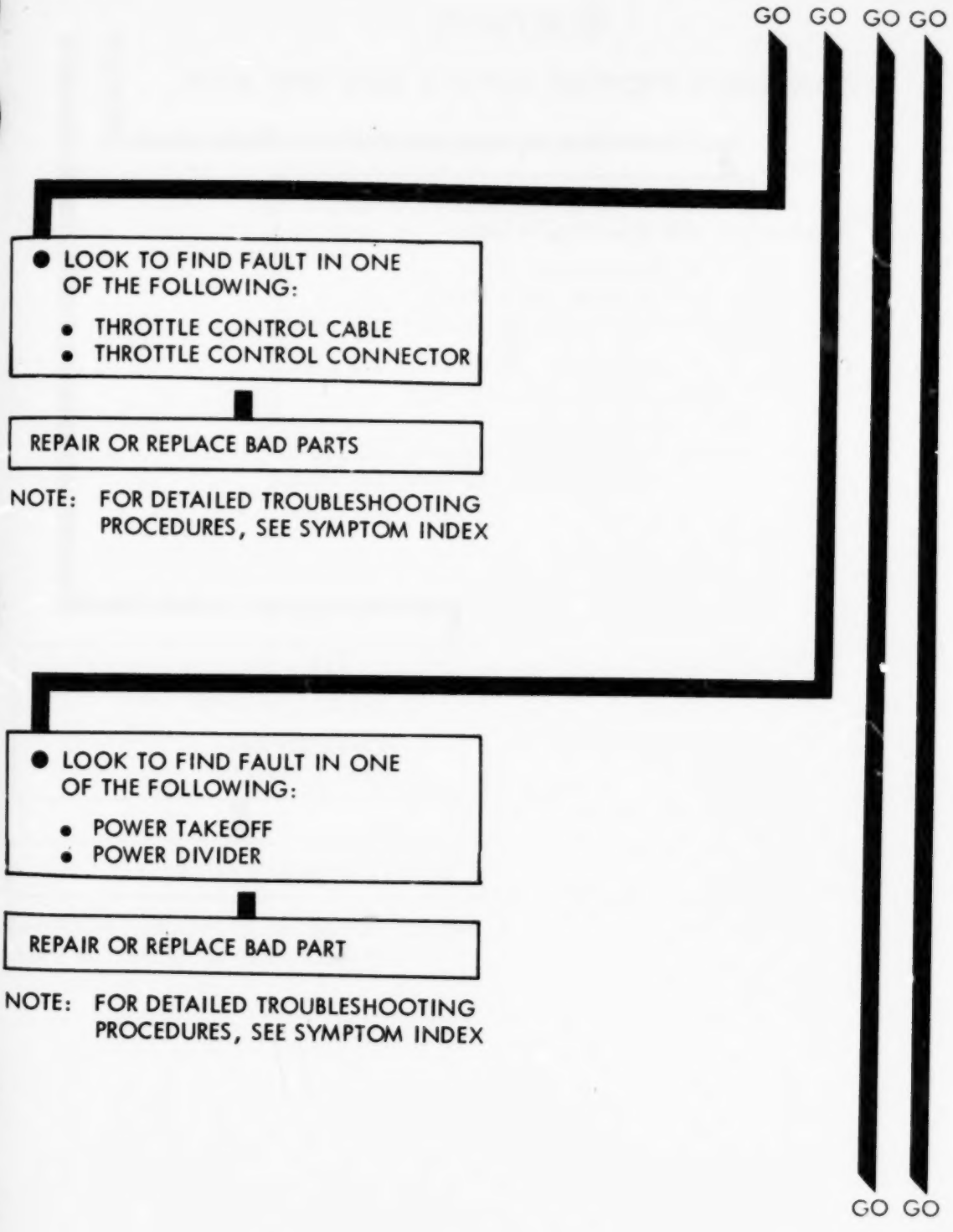
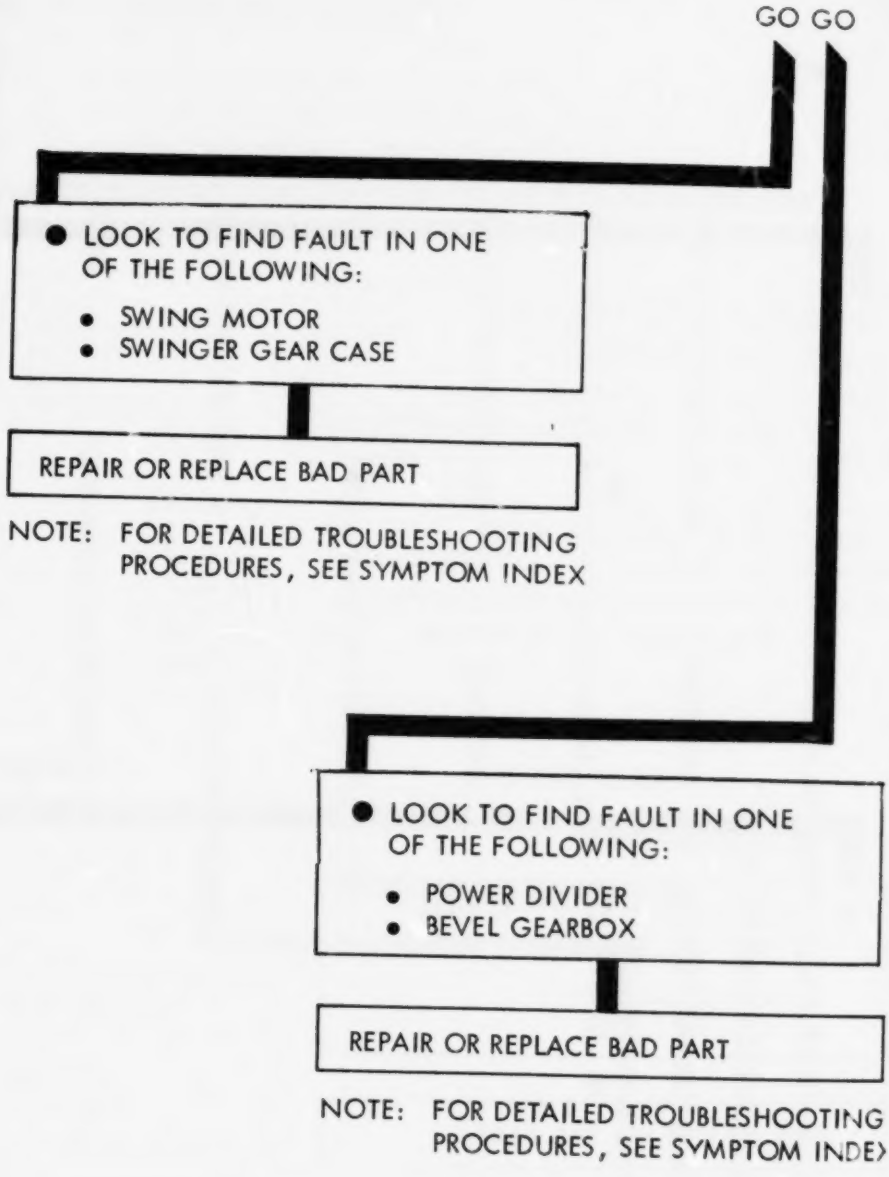

GO
GO
GO
GO
● LOOK TO FIND FAULT IN ONE OF THE FOLLOWING:
• THROTTLE CONTROL CABLE
• THROTTLE CONTROL CONNECTOR
REPAIR OR REPLACE BAD PARTS
NOTE: FOR DETAILED TROUBLESHOOTING PROCEDURES, SEE SYMPTOM INDEX
● LOOK TO FIND FAULT IN ONE OF THE FOLLOWING:
• POWER TAKEOFF
• POWER DIVIDER
REPAIR OR REPLACE BAD PART
NOTE: FOR DETAILED TROUBLESHOOTING PROCEDURES, SEE SYMPTOM INDEX
GO
GO
TA 118405

Figure 36-1 (Sheet 2 of 3)


GO GO
● LOOK TO FIND FAULT IN ONE OF THE FOLLOWING:
• SWING MOTOR
• SWINGER GEAR CASE
REPAIR OR REPLACE BAD PART
NOTE: FOR DETAILED TROUBLESHOOTING PROCEDURES, SEE SYMPTOM INDEX
● LOOK TO FIND FAULT IN ONE OF THE FOLLOWING:
• POWER DIVIDER
• BEVEL GEARBOX
REPAIR OR REPLACE BAD PART
NOTE: FOR DETAILED TROUBLESHOOTING PROCEDURES, SEE SYMPTOM INDE

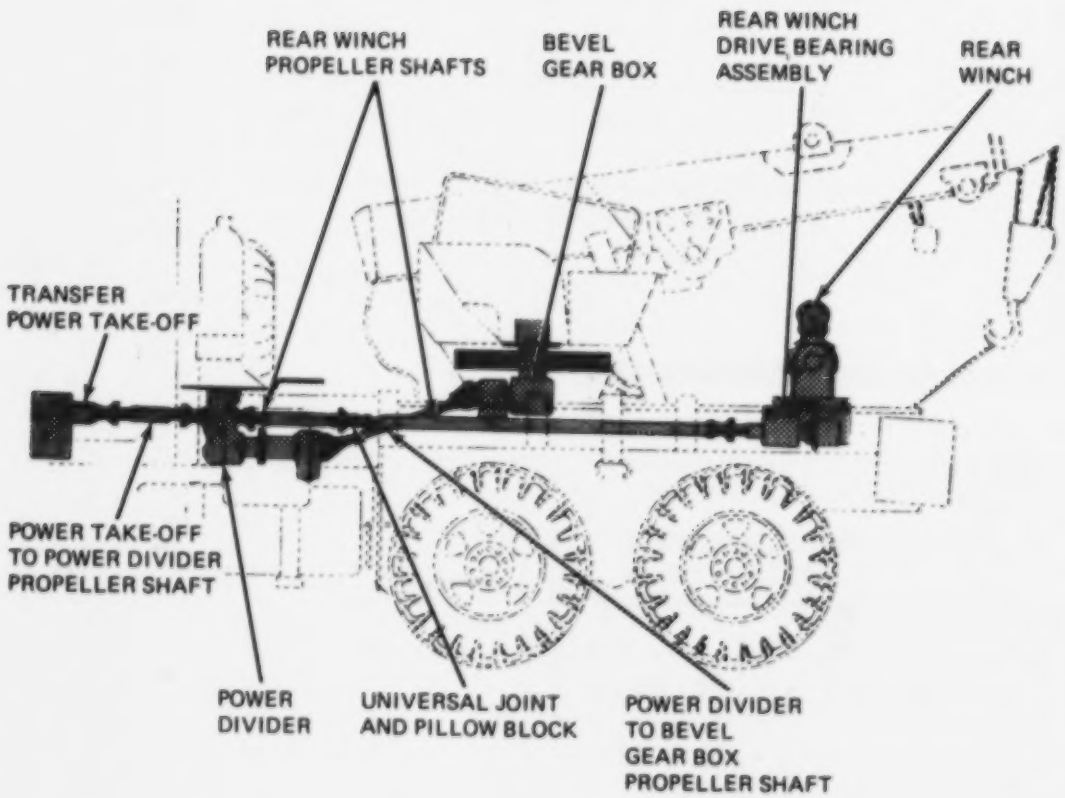
TA 118406

Figure 36-1 (Sheet 3 of 3)

CHAPTER 37

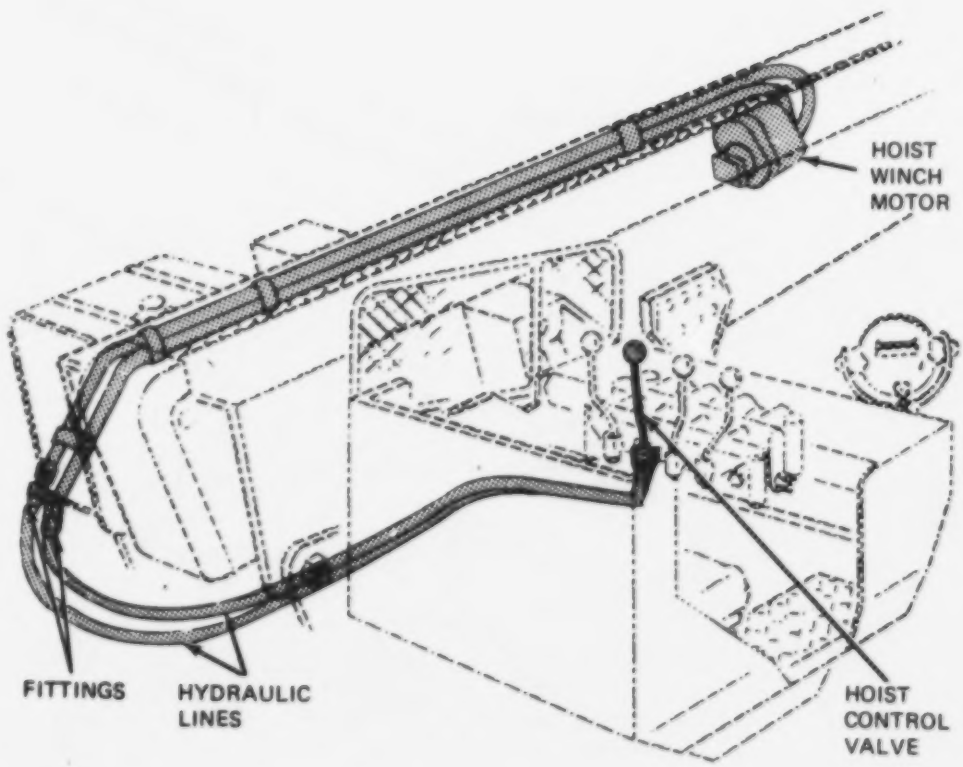
M816 WRECKER SYSTEM SUPPORT DIAGRAMS

37-1. GENERAL. This chapter gives the diagrams you need when doing trouble-shooting procedures in chapter 35. Figure 3-1 is a complete listing of all support diagrams used in this manual.


REAR WINCH PROPELLER SHAFTS
BEVEL GEAR BOX
REAR WINCH DRIVE BEARING ASSEMBLY
REAR WINCH
TRANSFER POWER TAKE-OFF
POWER TAKE-OFF TO POWER DIVIDER PROPELLER SHAFT
POWER DIVIDER
UNIVERSAL JOINT AND PILLOW BLOCK
POWER DIVIDER TO BEVEL GEAR BOX PROPELLER SHAFT

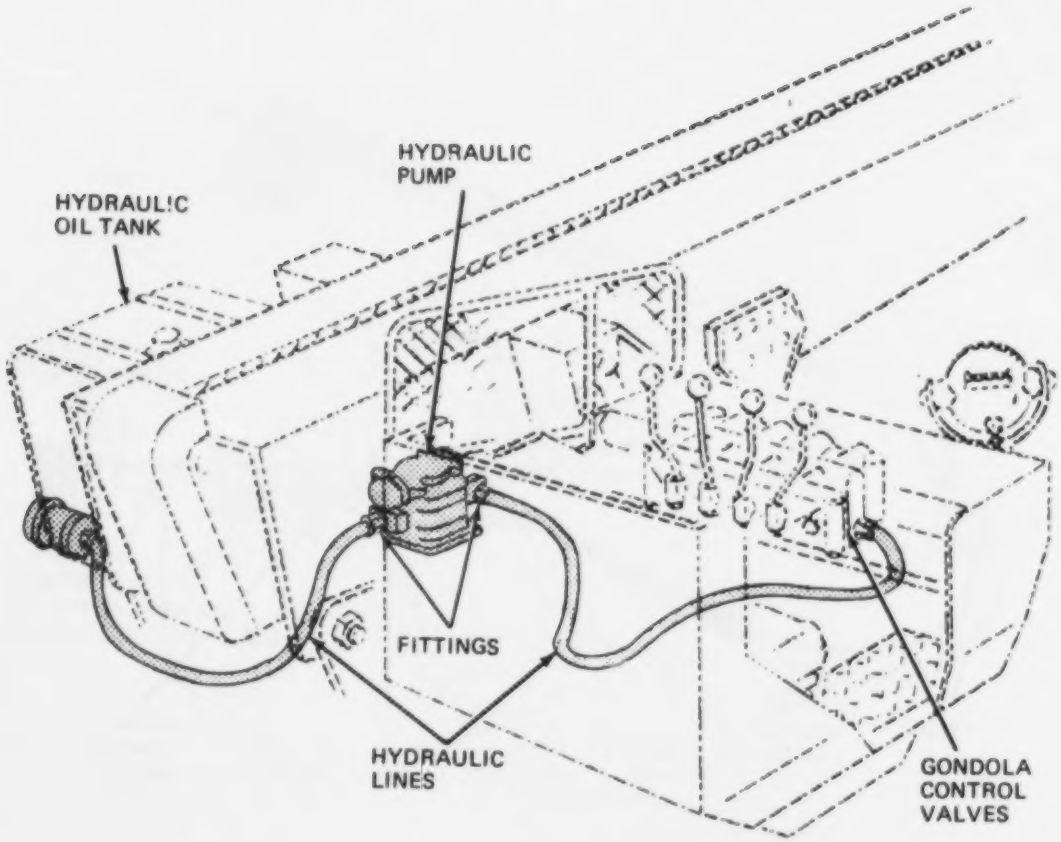
TA 118407

Figure 37-1. M816 Wrecker System



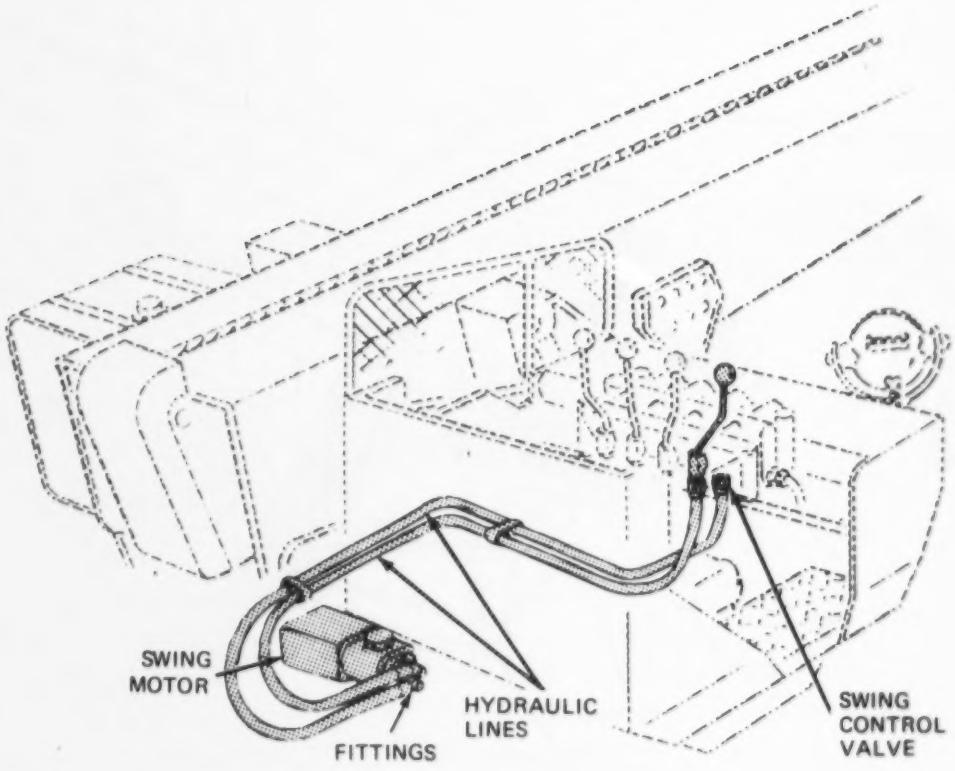
TA 118408

Figure 37-2. M816 Wrecker Hydraulic Lines to Hoist Winch Motor



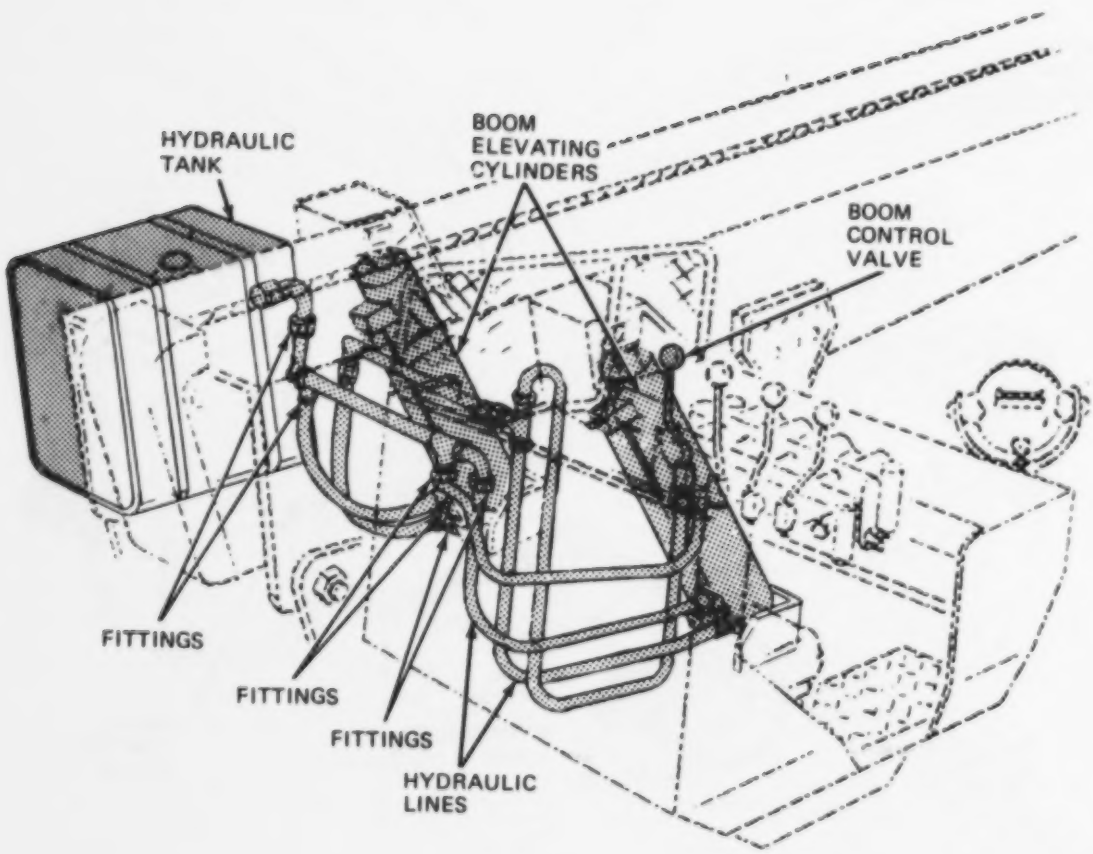
TA 118409

Figure 37-3. M816 Wrecker Hydraulic Lines to Hydraulic Pump



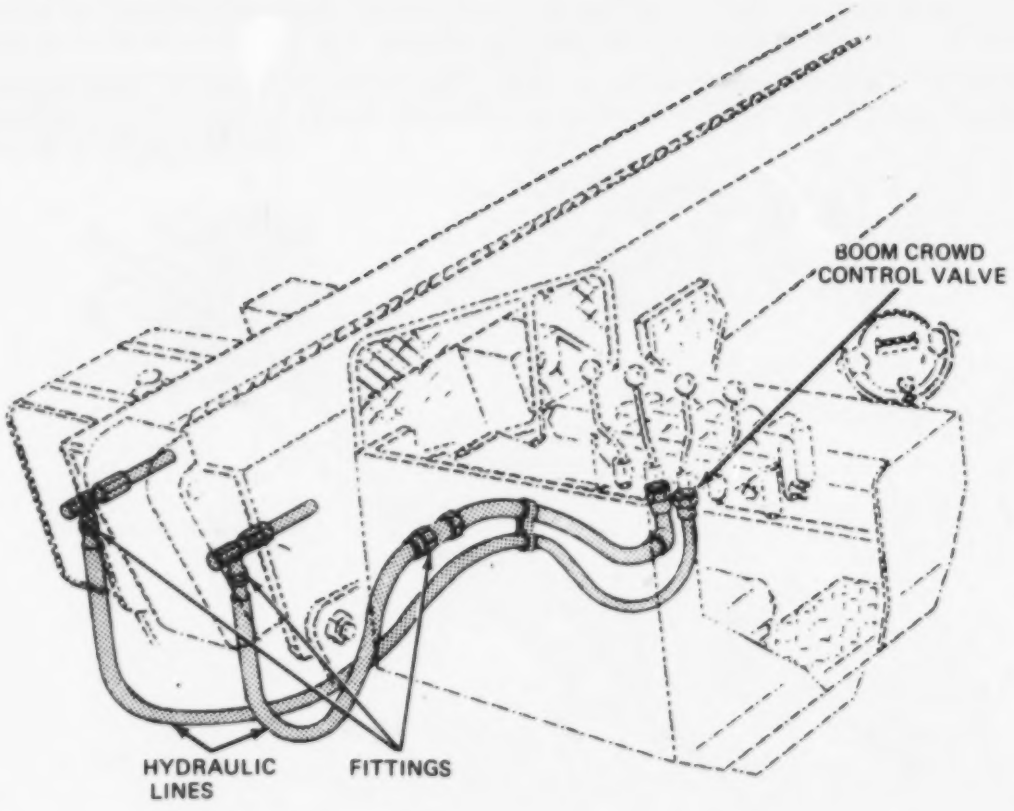
TA 118410

Figure 37-4. M816 Wrecker Hydraulic Lines to Swing Motor



TA 118411

Figure 37-5. M816 Wrecker Hydraulic Lines to Boom Elevating Cylinder



TA 118412

Figure 37-6. M816 Wrecker Hydraulic Lines to Boom Crowd Control Valve

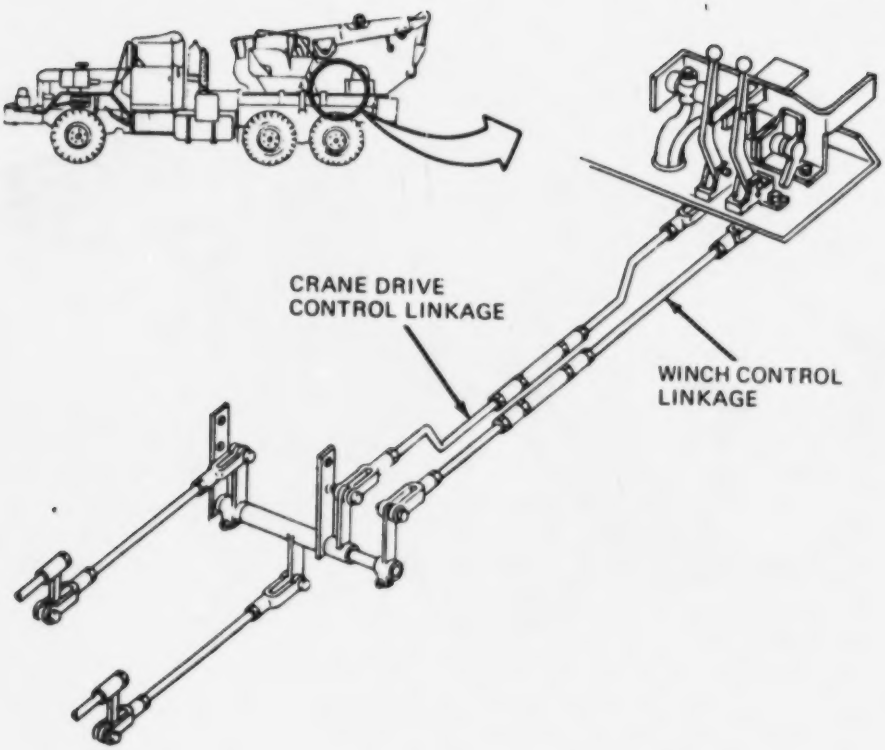


Figure 37-7. M816 Wrecker Control Linkages

TA 118413

CHAPTER 38

M819 WRECKER SYSTEM TROUBLESHOOTING

38-1. EQUIPMENT ITEMS COVERED. This chapter gives equipment troubleshooting procedures for the M819 Wrecker for which there are authorized corrective maintenance tasks at direct support and general support level of maintenance.

38-2. EQUIPMENT ITEMS NOT COVERED. All equipment items for which corrective maintenance is authorized at direct support and general support level of maintenance are covered in this chapter.

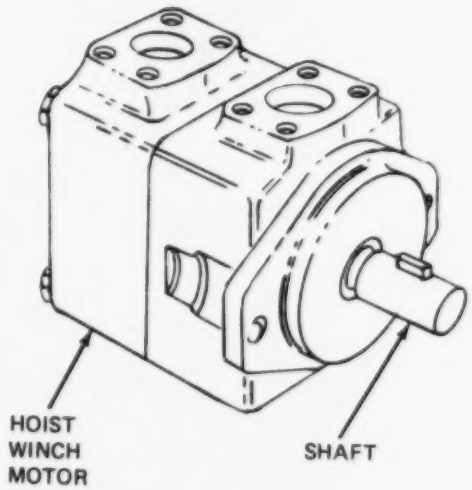
Symptom

1 HOIST WINCH DOES NOT PULL LOAD

1
- Make truck ready for work on wrecker
  - Remove load
  - Park truck. Refer to TM 9-2320-260-10
  - Chock wheels

2
- Check hoist winch motor assembly
  - Remove hoist winch motor. Refer to Vol 2, chapter 17, para 17-19
  - Feel for a loose or broken shaft
  - Feel if shaft turns freely

Is motor OK?



NO

3
- Repair or replace hoist winch motor assembly
  - Refer to Vol 2, chapter 17, para 17-19

YES

4
- Remove and repair cable drum assembly
  - Refer to Vol 2, chapter 17, para 17-21

TA 118414

Figure 38-1

Symptom 2

HOIST WINCH PULLS LOAD SLOWLY

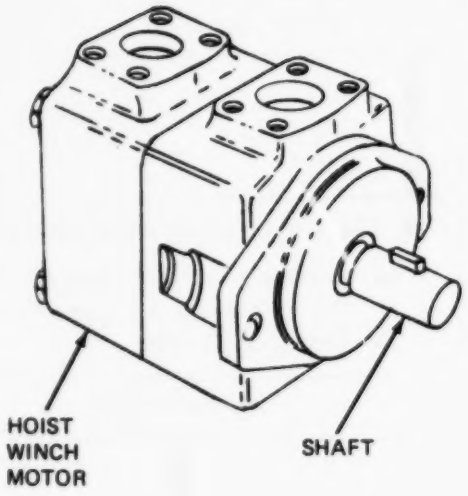
1

- Make truck ready for work on wrecker
  - Remove load
  - Park truck. Refer to TM 9-2320-260-10
  - Chock wheels

2

- Check hoist winch motor assembly
  - Remove hoist winch motor. Refer to Vol 2, chapter 17, para 17-19
  - Feel for a loose shaft
  - Feel if shaft turns freely

Is motor OK?



NO

3

- Repair or replace hoist winch motor assembly
  - Refer to Vol 2, chapter 17, para 17-19

YES

4

- Remove and repair cable drum assembly
  - Refer to Vol 2, chapter 17, para 17-21

TA 118415

Figure 38-2

3 Symptom

JERKY OPERATION AS HOIST WINCH PULLS LOAD

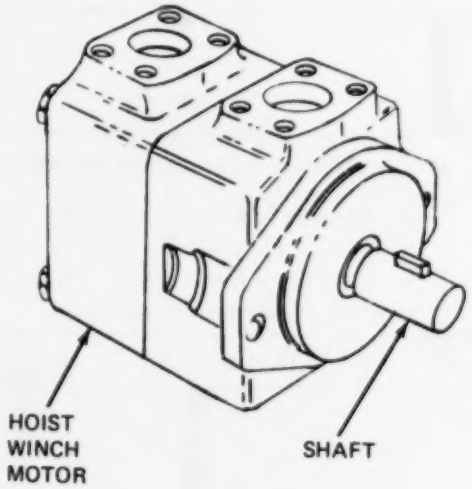
1

- Make truck ready for work on wrecker
  - Remove load
  - Park truck. Refer to TM 9-2320-260-10
  - Chock wheels

2

- Check hoist winch motor assembly
  - Remove hoist winch motor. Refer to Vol 2, chapter 17, para 17-19
  - Feel if shaft turns

Is motor OK?



NO

3

- Repair or replace hoist winch motor assembly
  - Refer to Vol 2, chapter 17, para 17-19

YES

4

- Remove and repair cable drum assembly
  - Refer to Vol 2, chapter 17, para 17-21

TA 118416

Figure 38-3

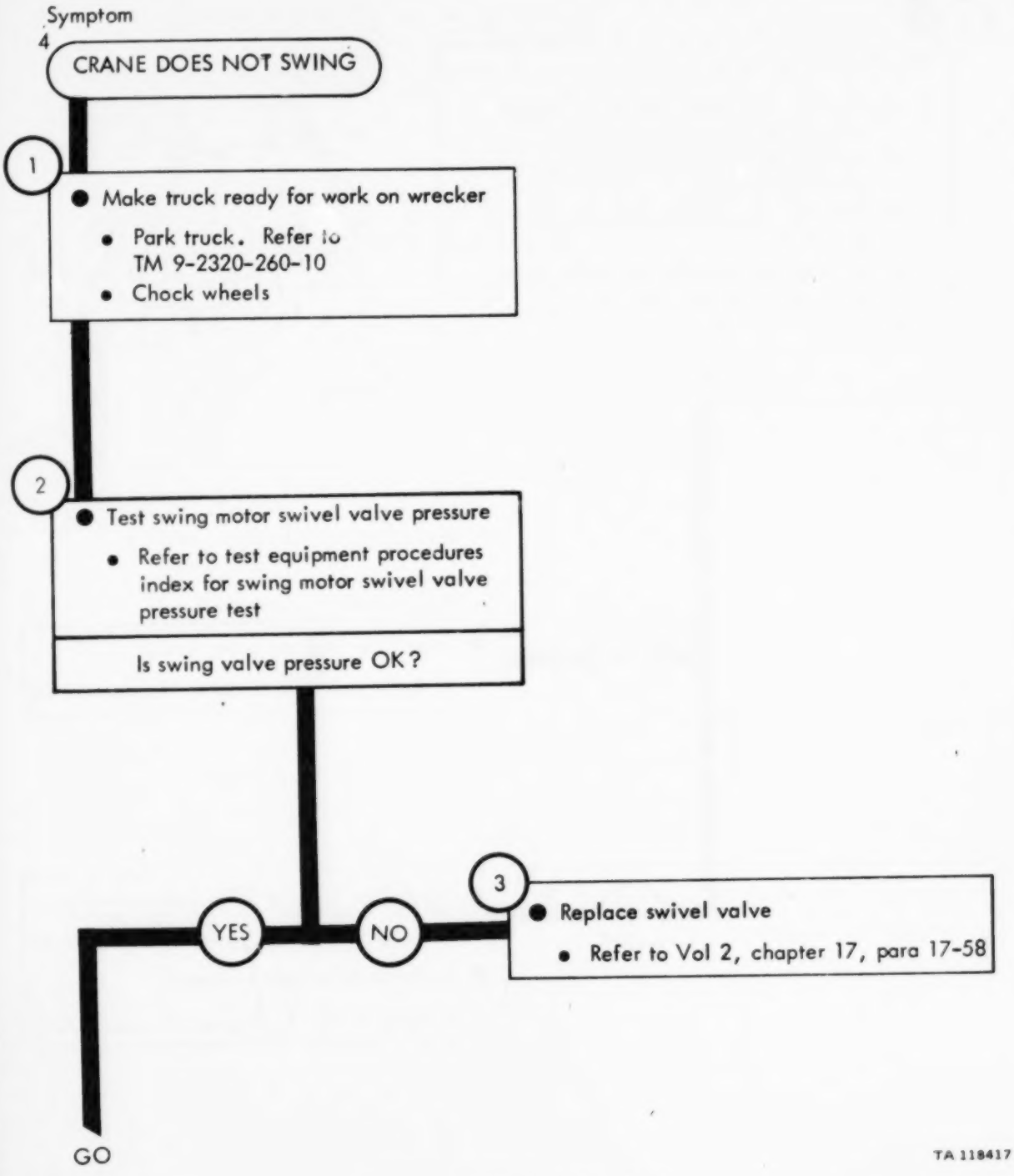


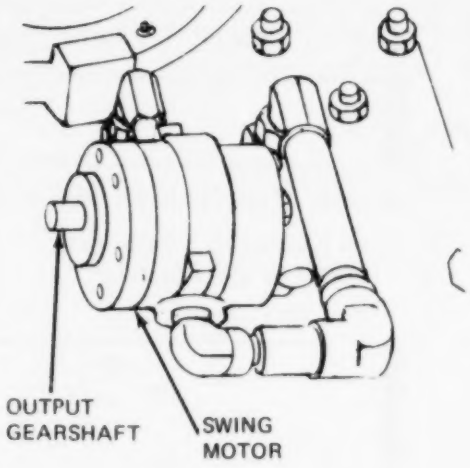
Figure 38-4 (Sheet 1 of 2)

GO

4

- Check swing motor
  - Remove drive gear assembly. Refer to Vol 2, chapter 17, para 17-57
  - Look to see if swing motor output gearshaft is broken
  - Feel for a loose or broken output gearshaft
  - Start engine and operate swing motor. Refer to TM 9-2320-260-10
  - See if output gearshaft turns

Is swing motor OK?



NO

5

- Repair, or replace swing motor
  - Refer to Vol 2, chapter 17, para 17-54

YES

6

- Repair , or replace drive gear assembly
  - Refer to Vol 2, chapter 17, para 17-57
- Put back drive gear assembly
  - Refer to Vol 2, chapter 17, para 17-57

TA 118418

Figure 38-4 (Sheet 2 of 2)

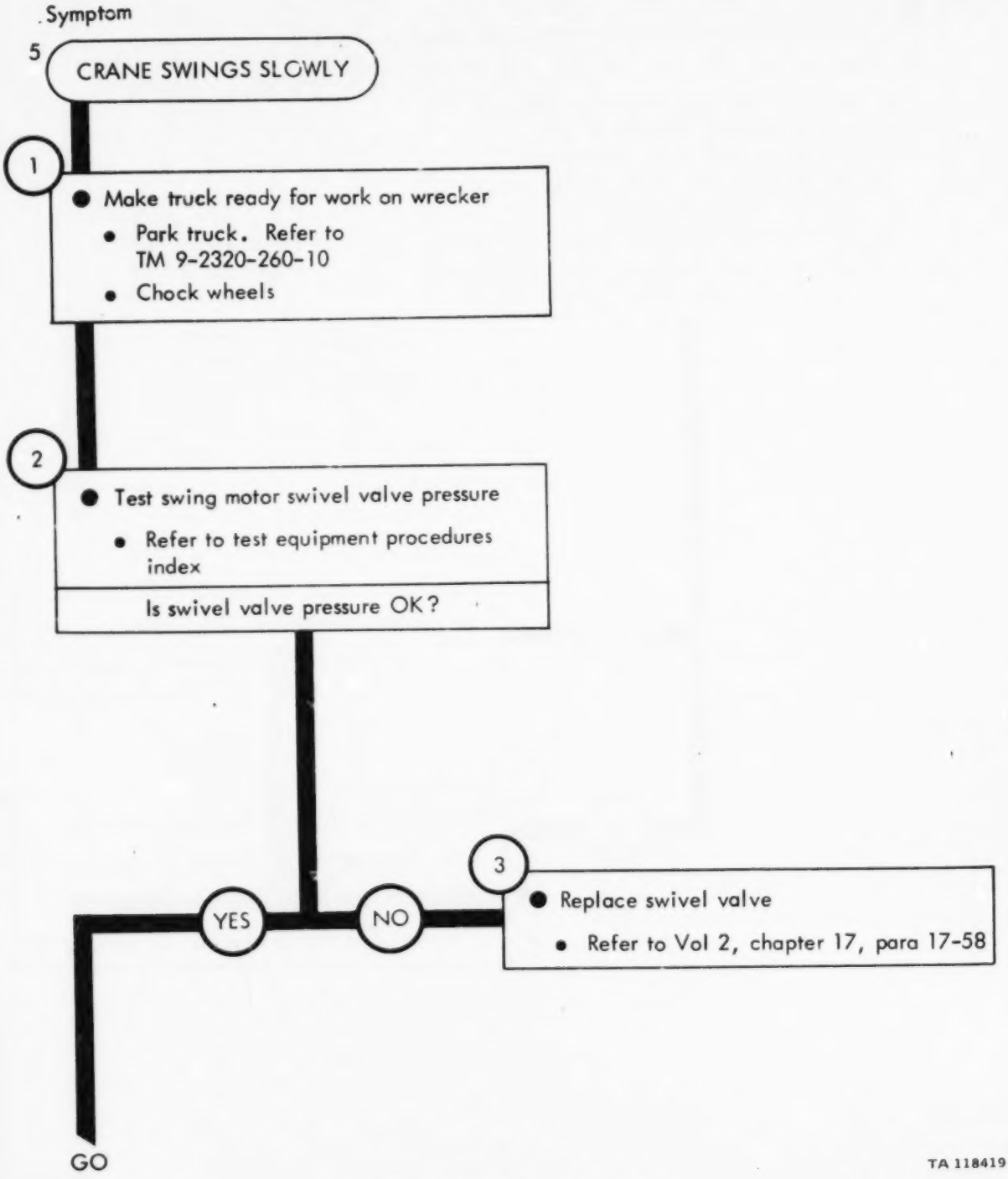


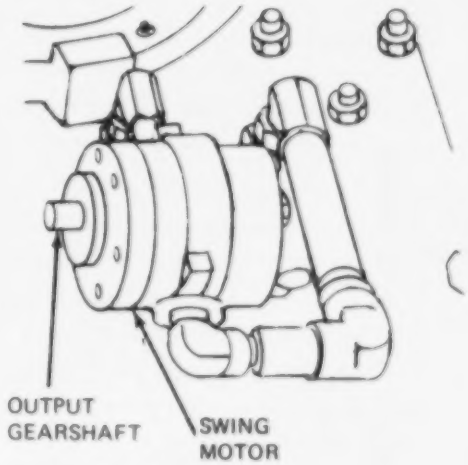
Figure 38-5 (Sheet 1 of 2)

GO

4

- Check swing motor
  - Remove drive gear assembly. Refer to Vol 2, chapter 17, para 17-57
  - Feel for a loose output gearshaft
  - Start engine and operate swing motor. Refer to TM 9-2320-260-10
  - See if output shaft turns slowly or binds

Is swing motor OK?



NO

5

- Repair, or replace swing motor
  - Refer to Vol 2, chapter 17, para 17-54

YES

6

- Repair, or replace drive gear assembly
  - Refer to Vol 2, chapter 17, para 17-57
- Put back drive gear assembly
  - Refer to Vol 2, chapter 17, para 17-57

TA 118420

Figure 38-5 (Sheet 2 of 2)

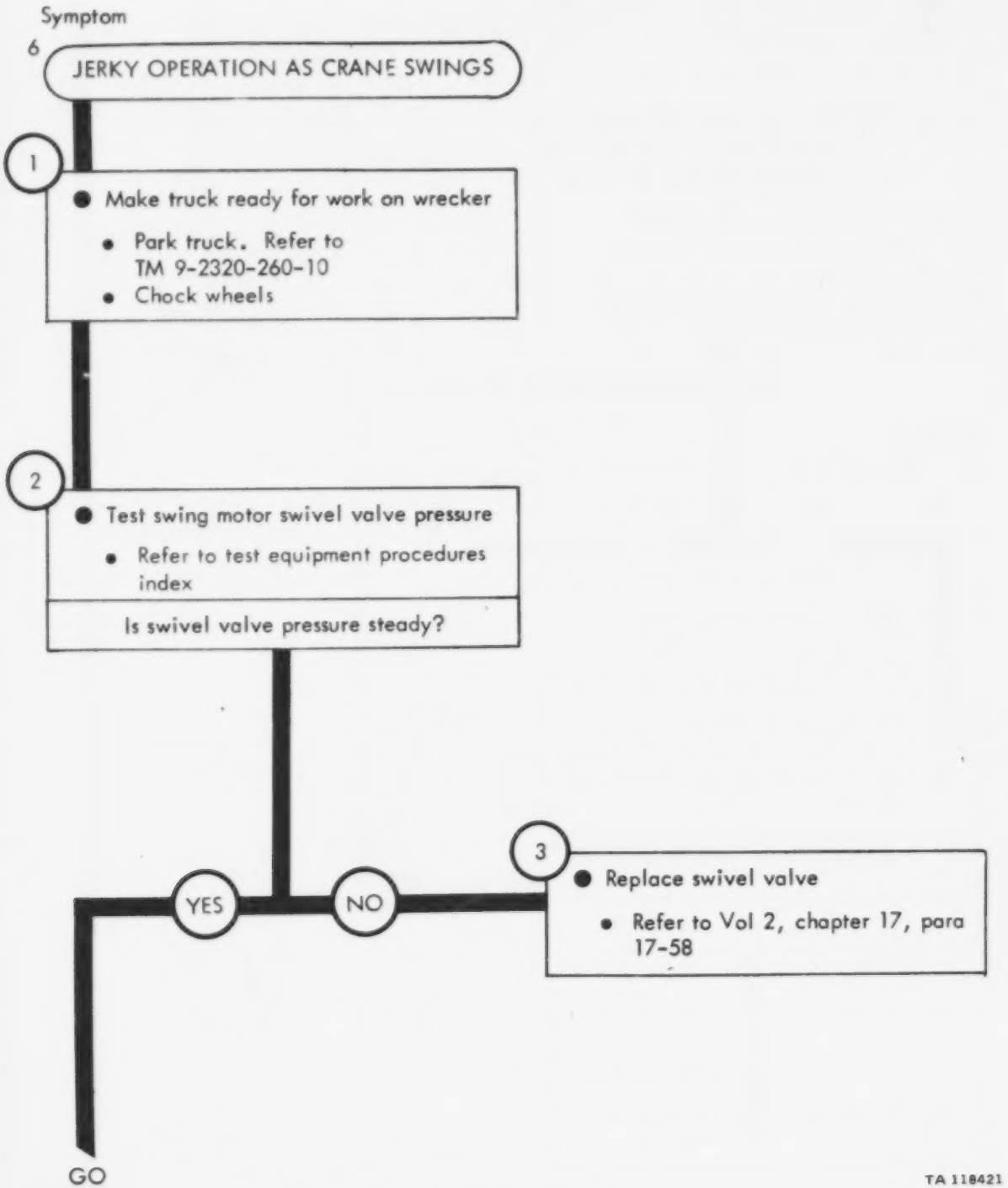


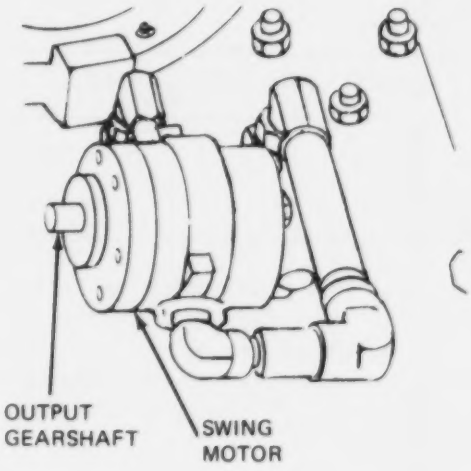
Figure 38-6 (Sheet 1 of 4)

GO

4

- Check swing motor
  - Remove drive gear assembly. Refer to Vol 2, chapter 17, para 17-57
  - Start engine and operate swing motor. Refer to TM 9-2320-260-10
  - See if output shaft turns steadily

Does swing motor turn steadily?



YES

NO

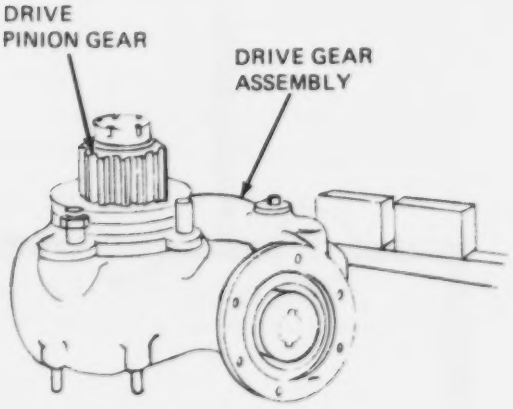
5

- Repair, or replace swing motor
  - Refer to Vol 2, chapter 17, para 17-54

6

- Check drive pinion gear in drive gear assembly
  - Look for teeth missing or broken on drive pinion gear

Is drive pinion gear OK?



GO

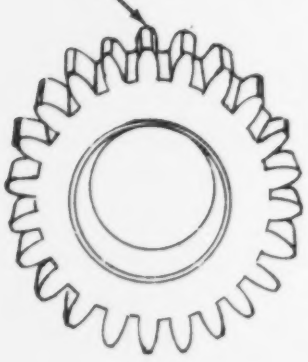
TA 118422

Figure 38-6 (Sheet 2 of 4)

GO

NO GO

PINION IDLER GEAR



7

- Replace drive pinion gear
  - Refer to Vol 2, chapter 17, para 17-57
- Check drive pinion idler gear
  - Remove pinion idler gear. Refer to Vol 2, chapter 17, para 17-57
  - Look for missing teeth on gear

Is drive pinion idler gear OK?

YES

8

- Put back drive pinion idler gear
  - Refer to Vol 2, chapter 17, para 17-57
- Put back drive gear assembly
  - Refer to Vol 2, chapter 17, para 17-57
- Put back swing motor
  - Refer to Vol 2, chapter 17, para 17-54

NO

9

- Replace drive pinion idler gear
  - Refer to Vol 2, chapter 17, para 17-57
- Put back drive gear assembly
  - Refer to Vol 2, chapter 17, para 17-57
- Put back swing motor
  - Refer to Vol 2, chapter 17, para 17-54

GO

TA 118423

Figure 38-6 (Sheet 3 of 4)

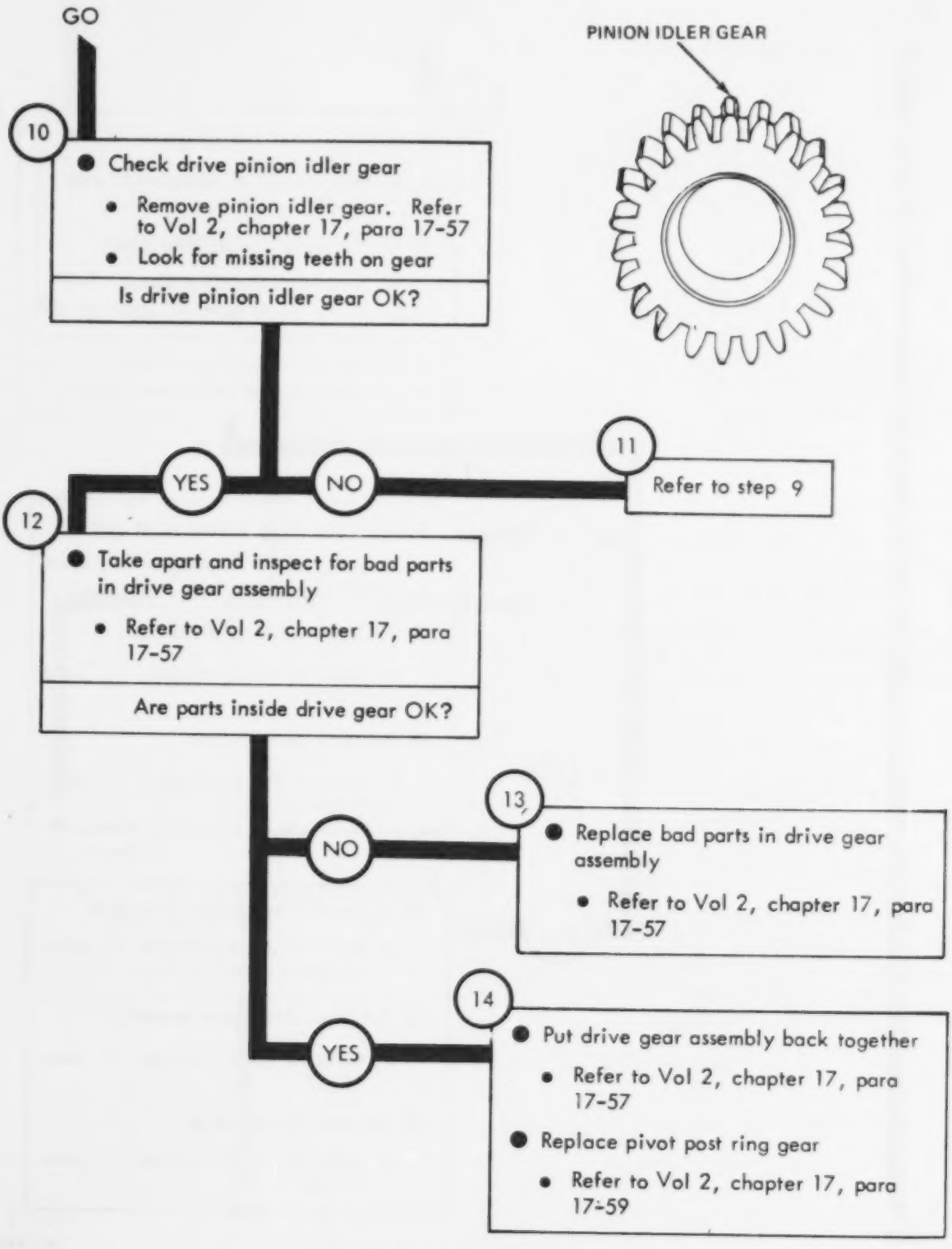

GO
10
● Check drive pinion idler gear
• Remove pinion idler gear. Refer to Vol 2, chapter 17, para 17-57
• Look for missing teeth on gear
Is drive pinion idler gear OK?
YES
NO
11
Refer to step 9
12
● Take apart and inspect for bad parts in drive gear assembly
• Refer to Vol 2, chapter 17, para 17-57
Are parts inside drive gear OK?
NO
13
● Replace bad parts in drive gear assembly
• Refer to Vol 2, chapter 17, para 17-57
YES
14
● Put drive gear assembly back together
• Refer to Vol 2, chapter 17, para 17-57
● Replace pivot post ring gear
• Refer to Vol 2, chapter 17, para 17-59
PINION IDLER GEAR
TA 118424

Figure 38-6 (Sheet 4 of 4)

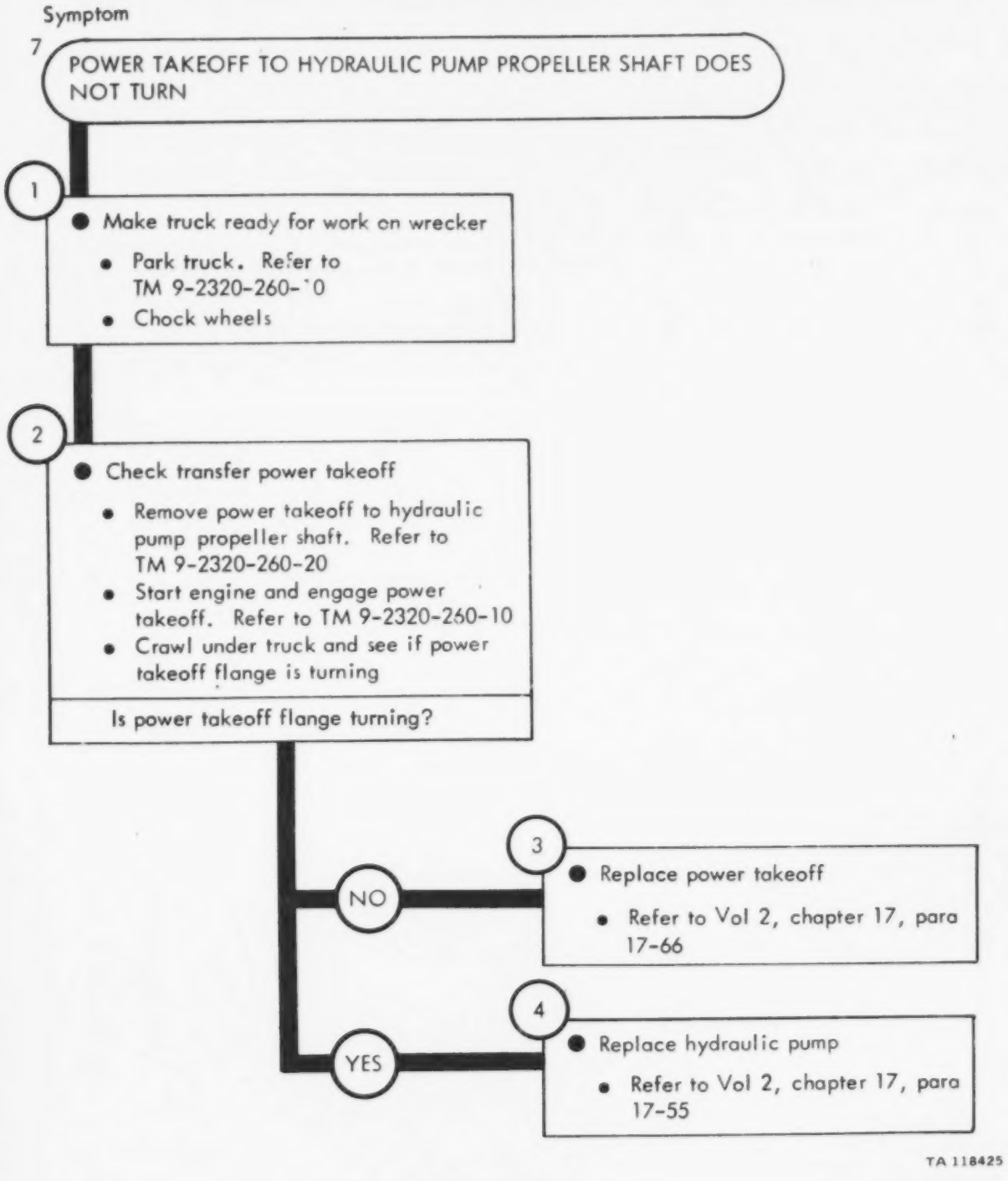

Symptom
7
POWER TAKEOFF TO HYDRAULIC PUMP PROPELLER SHAFT DOES NOT TURN
1
Make truck ready for work on wrecker
Park truck. Refer to TM 9-2320-260-10
Chock wheels
2
Check transfer power takeoff
Remove power takeoff to hydraulic pump propeller shaft. Refer to TM 9-2320-260-20
Start engine and engage power takeoff. Refer to TM 9-2320-260-10
Crawl under truck and see if power takeoff flange is turning
Is power takeoff flange turning?
NO
3
Replace power takeoff
Refer to Vol 2, chapter 17, para 17-66
YES
4
Replace hydraulic pump
Refer to Vol 2, chapter 17, para 17-55
TA 118425

Figure 38-7

CHAPTER 39

M819 WRECKER SYSTEM TROUBLESHOOTING SUMMARY

39-1. GENERAL. This chapter gives a summary of troubleshooting procedures given in chapter 38, for the M819 Wrecker.

39-2. PROCEDURES. The summary in this chapter covers all fault symptoms found in the detailed troubleshooting procedures. Chapter 7 outlines a sample trouble-shooting procedure. The summary procedures are based on the "what-to-do" portions of the detailed procedures and do not include the "how-to-do-it" instructions. Warnings, cautions, and notes are given where needed.

M819 WRECKER SYSTEM TROUBLESHOOTING SUMMARY

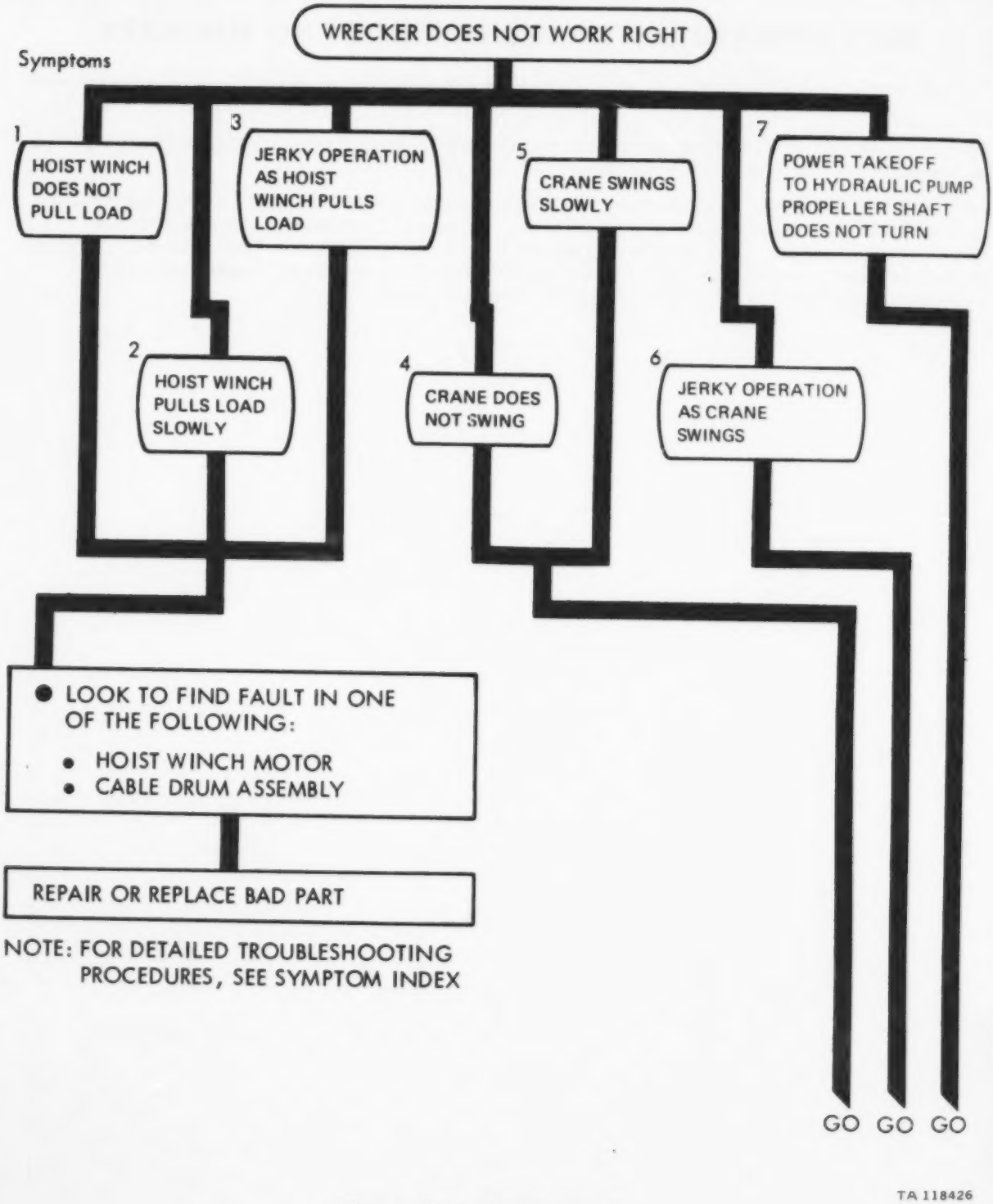


Figure 39-1 (Sheet 1 of 3)

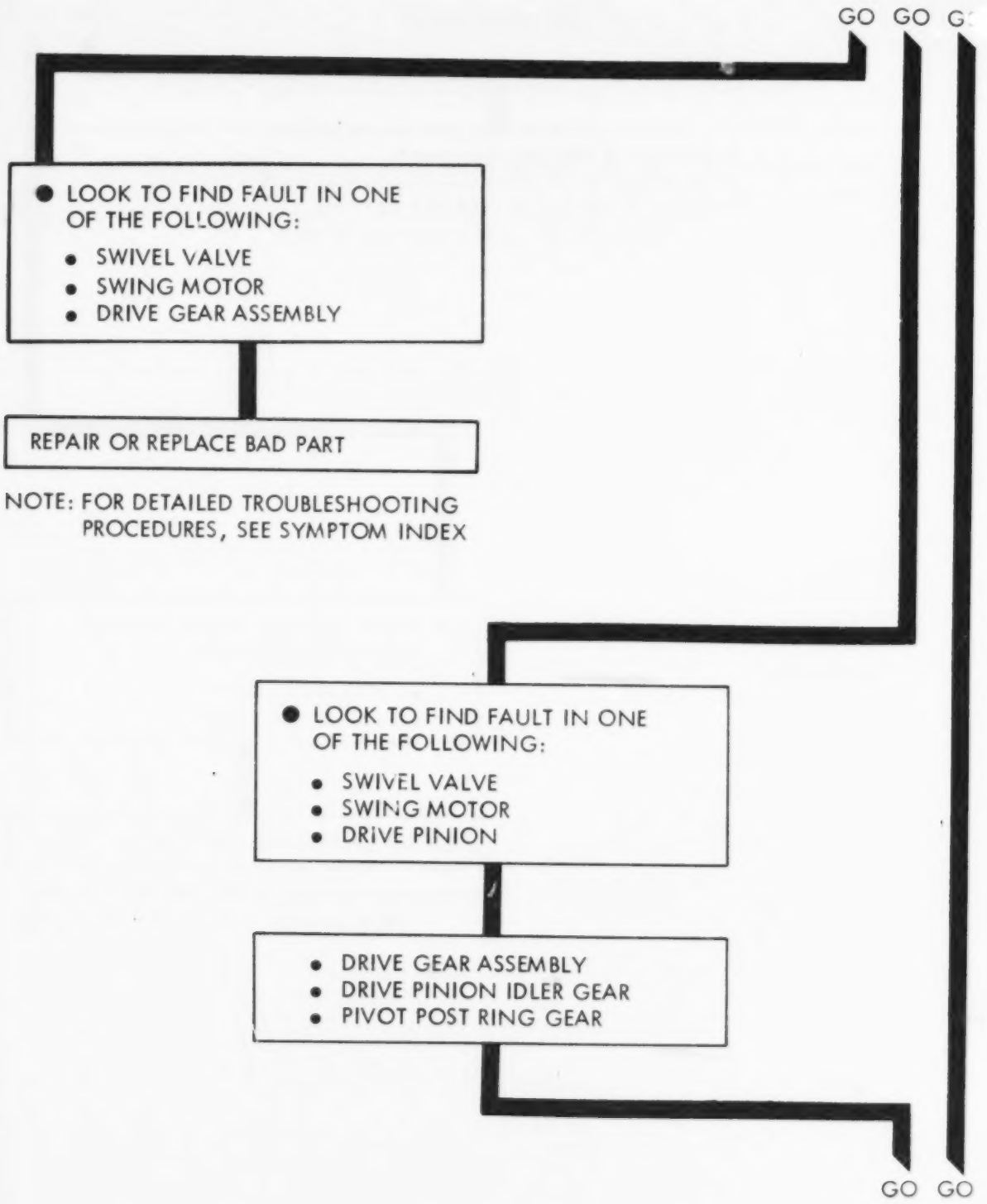
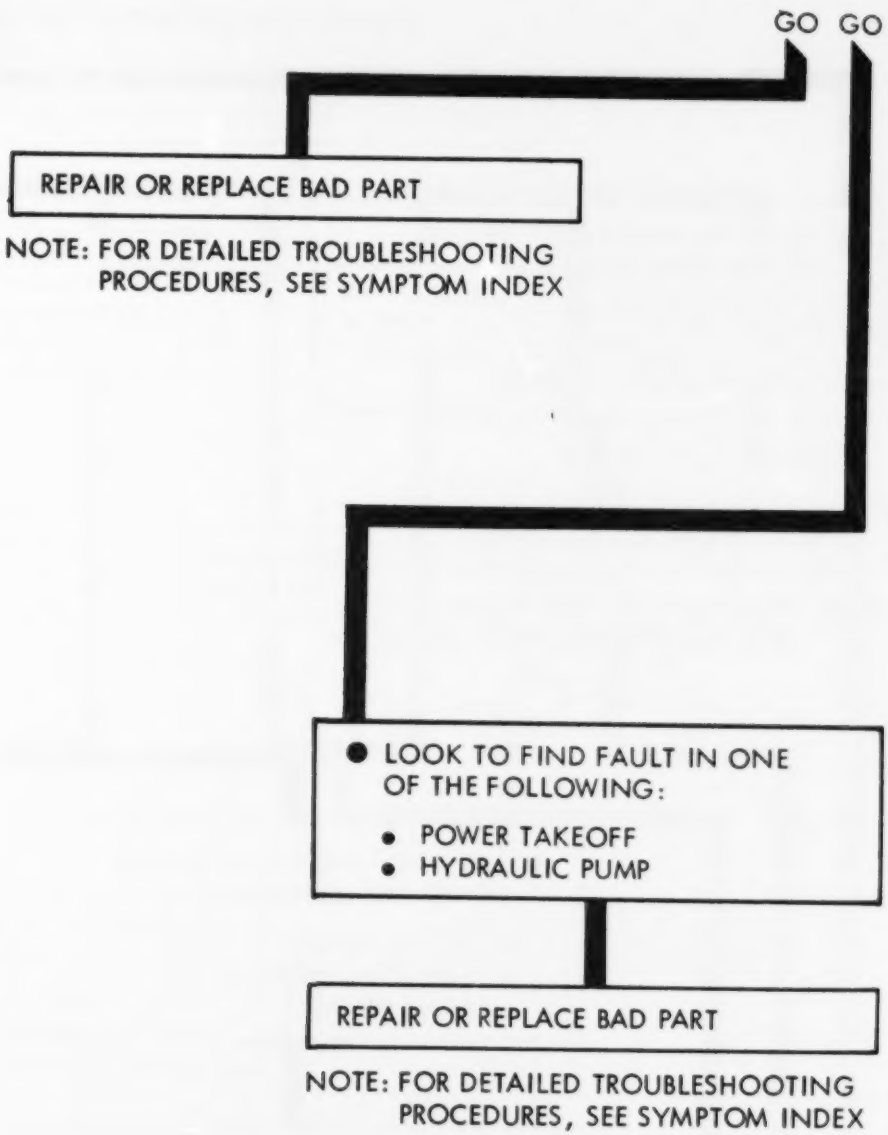

GO GO G
● LOOK TO FIND FAULT IN ONE OF THE FOLLOWING:
• SWIVEL VALVE
• SWING MOTOR
• DRIVE GEAR ASSEMBLY
REPAIR OR REPLACE BAD PART
NOTE: FOR DETAILED TROUBLESHOOTING PROCEDURES, SEE SYMPTOM INDEX
● LOOK TO FIND FAULT IN ONE OF THE FOLLOWING:
• SWIVEL VALVE
• SWING MOTOR
• DRIVE PINION
• DRIVE GEAR ASSEMBLY
• DRIVE PINION IDLER GEAR
• PIVOT POST RING GEAR
GO GO
TA 118427

Figure 39-1 (Sheet 2 of 3)

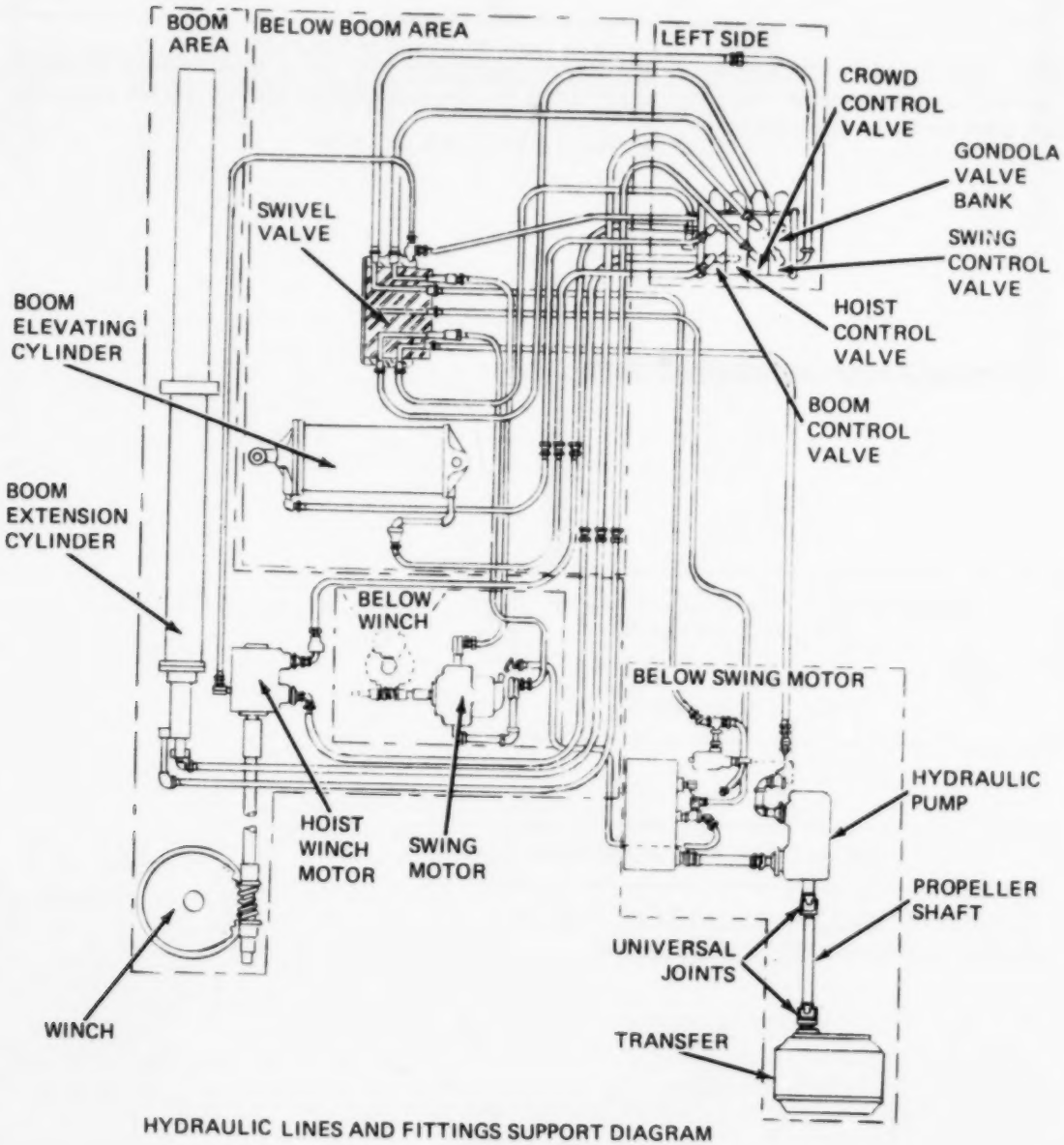

GO
GO
REPAIR OR REPLACE BAD PART
NOTE: FOR DETAILED TROUBLESHOOTING PROCEDURES, SEE SYMPTOM INDEX
● LOOK TO FIND FAULT IN ONE OF THE FOLLOWING:
• POWER TAKEOFF
• HYDRAULIC PUMP
REPAIR OR REPLACE BAD PART
NOTE: FOR DETAILED TROUBLESHOOTING PROCEDURES, SEE SYMPTOM INDEX
TA 118428

Figur. 39-1 (Sheet 3 of 3)

CHAPTER 40

M819 WRECKER SYSTEM SUPPORT DIAGRAMS

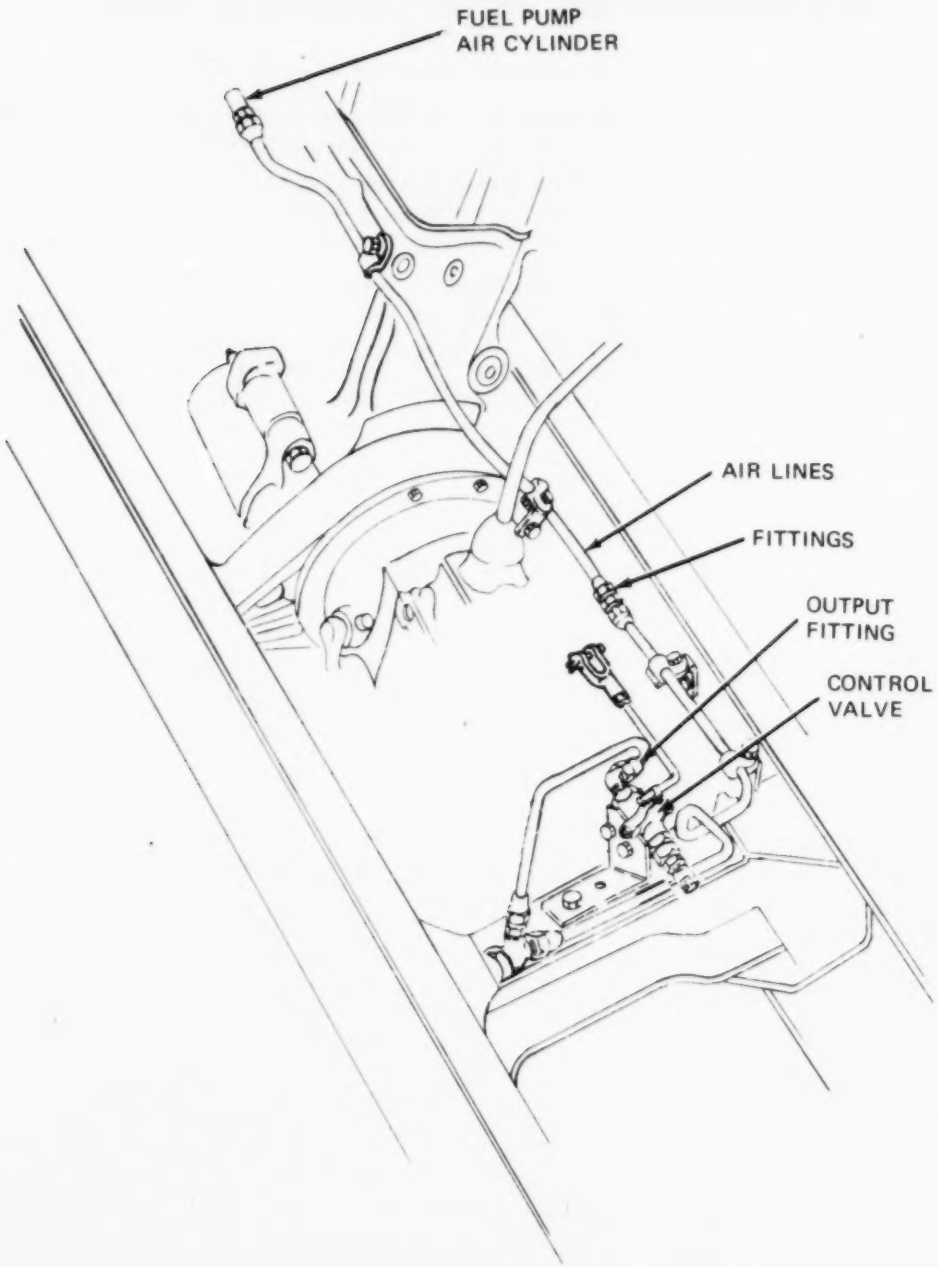
40-1. GENERAL. This chapter gives the diagrams you need when doing trouble-shooting procedures in chapter 38. Figure 3-1 is a complete listing of all support diagrams used in this manual.



HYDRAULIC LINES AND FITTINGS SUPPORT DIAGRAM

TA 118429

Figure 40-1. M819 Wrecker Hydraulic Lines and Fittings



TA 118430

Figure 40-2. M819 Air Lines and Fittings

CHAPTER 41

M819 WRECKER SYSTEM TEST PROCEDURES

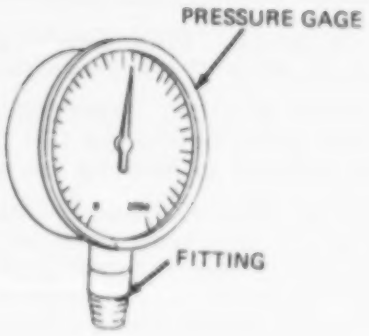
41-1. GENERAL. This chapter gives test procedures for the tests given in chapter 38, M819 Wrecker System.

41-2. TEST SET-UP. Instructions for setup of test equipment and parts to be tested are given before the test procedures. Illustrations are used, when needed, to show you how to hook up the test equipment to the part to be tested.

41-3. TEST PROCEDURE. Detailed step-by-step instructions, in flow chart form, are given for each test. The procedure calls out the type of test and the condition of the truck system for each part of testing. The step-by-step test will lead you to the bad component or to a fault symptom within a related system. Reference is made to the fault symptom index, chapter 6, if the test shows a fault in another system.

GENERAL INSTRUCTIONS

- Check pressure gage before using
  - Gage - make sure that glass and needle are not broken
  - Fitting - make sure fitting is tight on gage. See if fitting end is dirt free

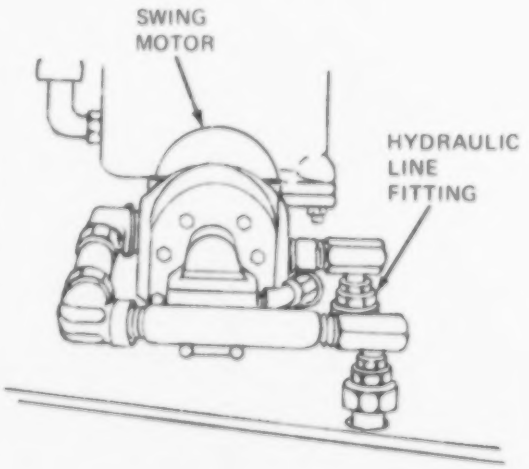


SWING MOTOR SWIVEL VALVE PRESSURE TEST - To check output pressure from swivel valve to swing motor

1

- Set up gage as follows
  - Using 1 3/4-inch wrench, unscrew and take off hydraulic line fitting to swing motor
  - Screw in suitable T-fitting adapter and tighten using adjustable wrench
  - Screw in test gage and tighten using adjustable wrench
  - Screw in hydraulic line and tighten using 1 3/4-inch wrench

GO



TA 118431

Figure 41-1 (Sheet 1 of 3)

GO

NOTE

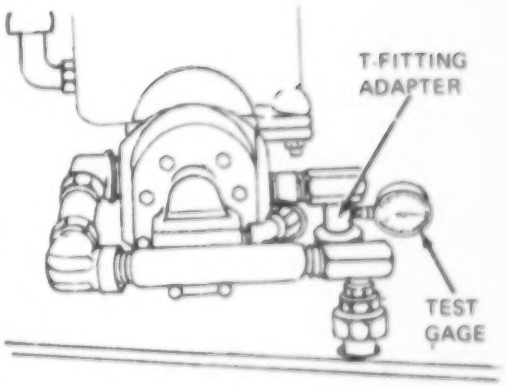
The next step will need the use of two soldiers. The lead soldier will be called Soldier A, and the helper will be called Soldier B

2

- Test pressure from swivel valve to swing motor

SOLDIER B
- Start engine and engage wrecker crane drive. Refer to TM 9-2320-260-10
- Go to gondola and wait for instructions from Soldier A

SOLDIER A:
- Look at pressure gage
- Tell Soldier B to swing boom



GO

TA 118432

Figure 41-1 (Sheet 2 of 3)

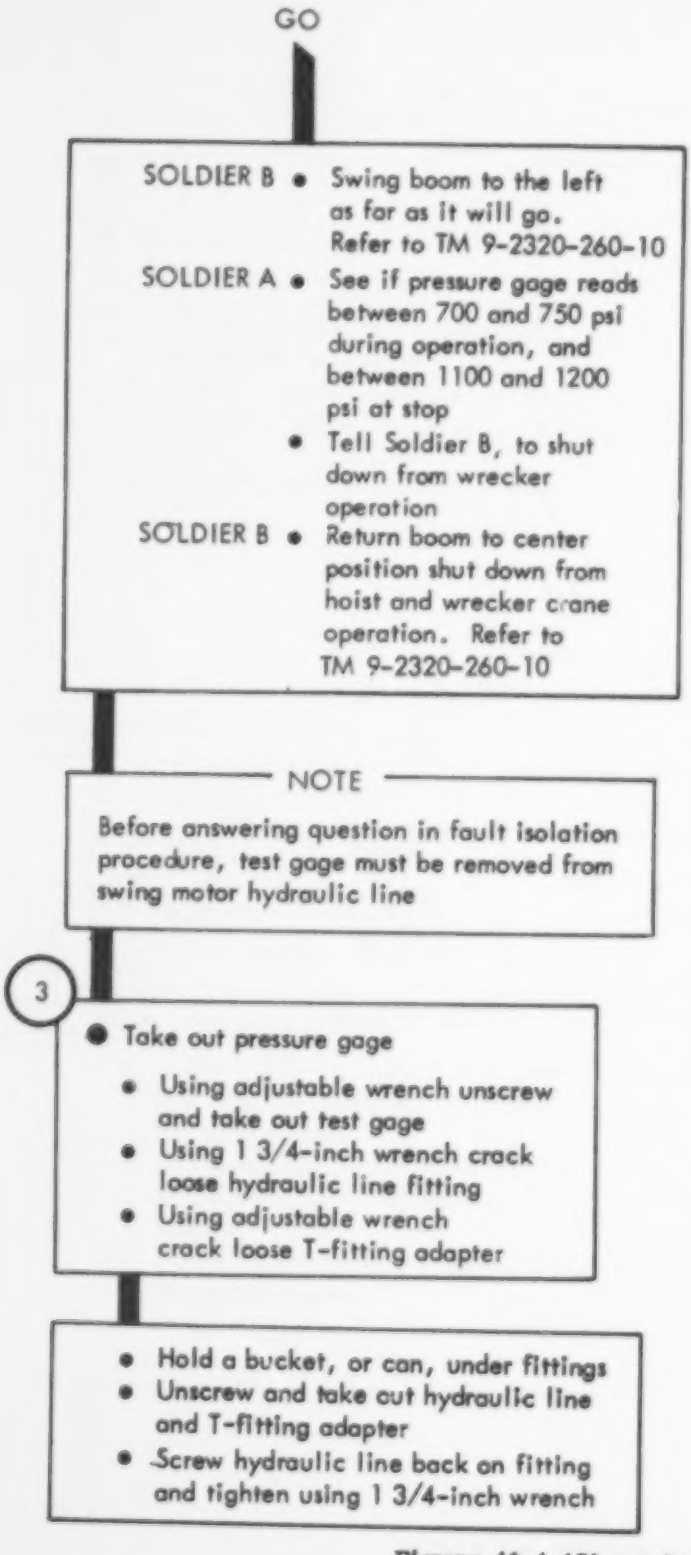

GO
SOLDIER B • Swing boom to the left as far as it will go. Refer to TM 9-2320-260-10
SOLDIER A • See if pressure gage reads between 700 and 750 psi during operation, and between 1100 and 1200 psi at stop
• Tell Soldier B, to shut down from wrecker operation
SOLDIER B • Return boom to center position shut down from hoist and wrecker crane operation. Refer to TM 9-2320-260-10
NOTE
Before answering question in fault isolation procedure, test gage must be removed from swing motor hydraulic line
3
• Take out pressure gage
• Using adjustable wrench unscrew and take out test gage
• Using 1 3/4-inch wrench crack loose hydraulic line fitting
• Using adjustable wrench crack loose T-fitting adapter
• Hold a bucket, or can, under fittings
• Unscrew and take out hydraulic line and T-fitting adapter
• Screw hydraulic line back on fitting and tighten using 1 3/4-inch wrench
TA 118433

Figure 41-1 (Sheet 3 of 3)

CHAPTER 42

M819 WRECKER SYSTEM CHECKOUT PROCEDURES

42-1. GENERAL. This chapter gives procedures for checking out the wrecker after troubleshooting and repair have been done. Procedures are set up in flow chart form showing the checkout steps in order and referring to the fault symptom index when the system does not check out.

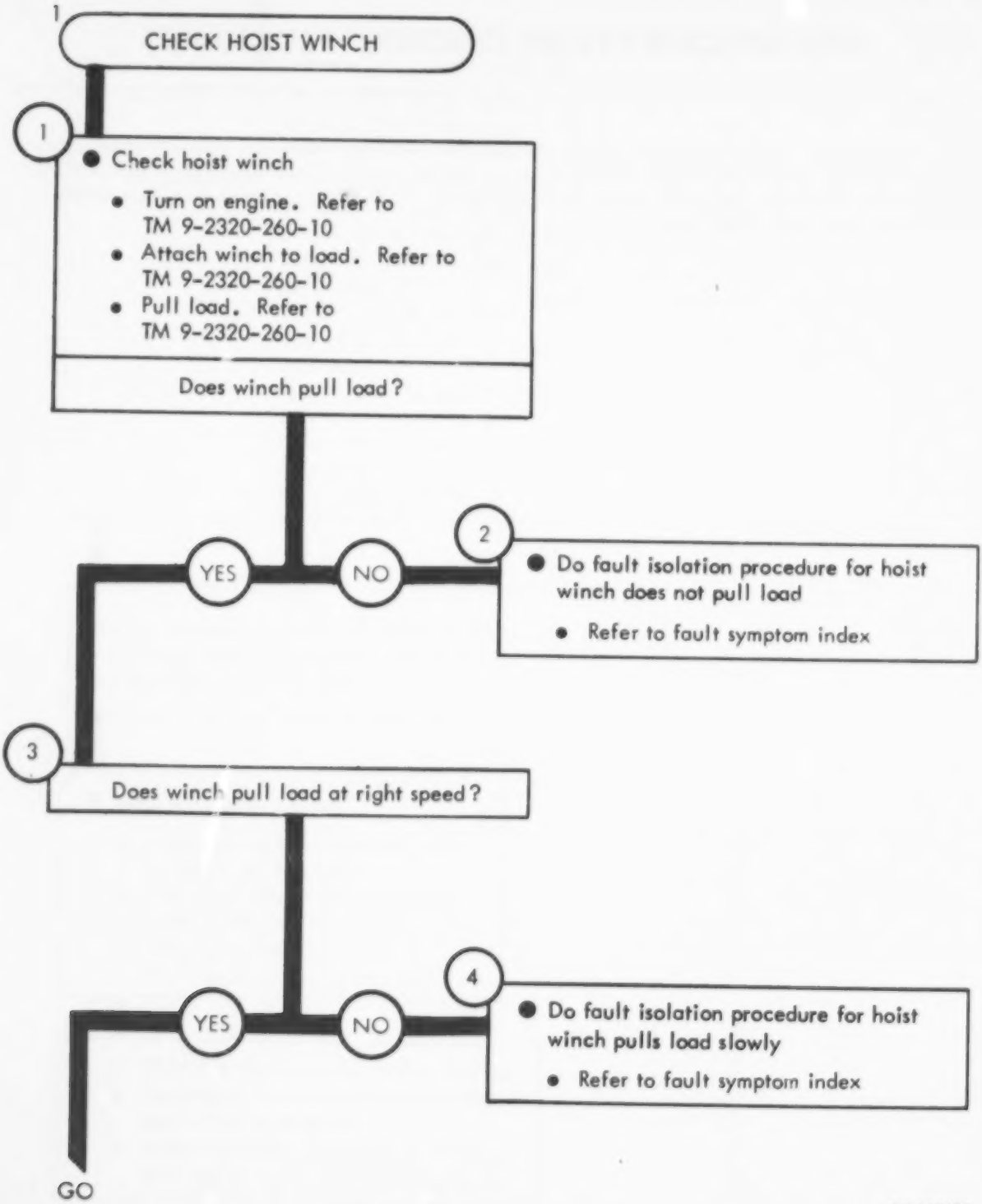
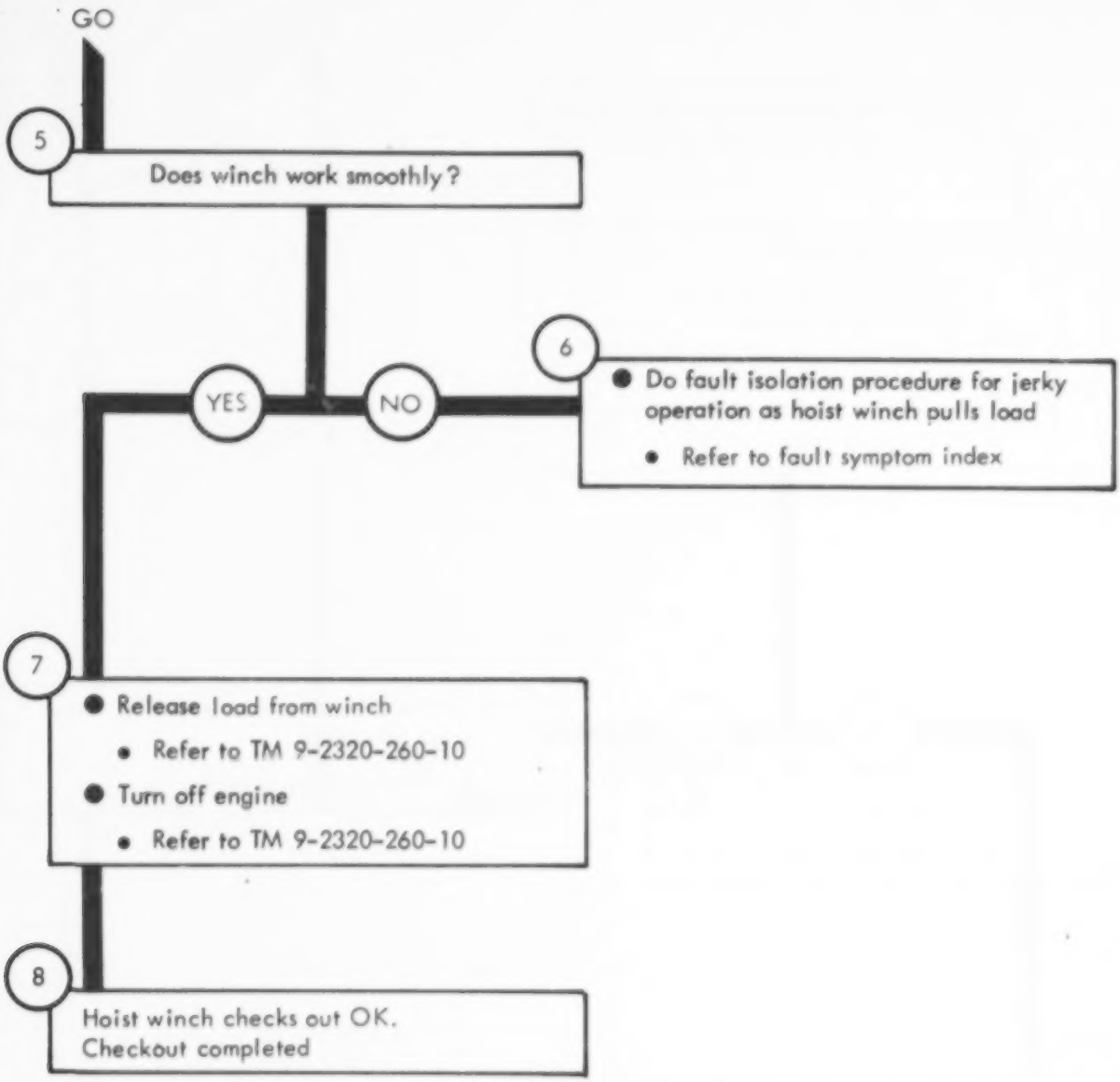


Figure 42-1 (Sheet 1 of 2)



TA 118435

Figure 42-1 (Sheet 2 of 2)

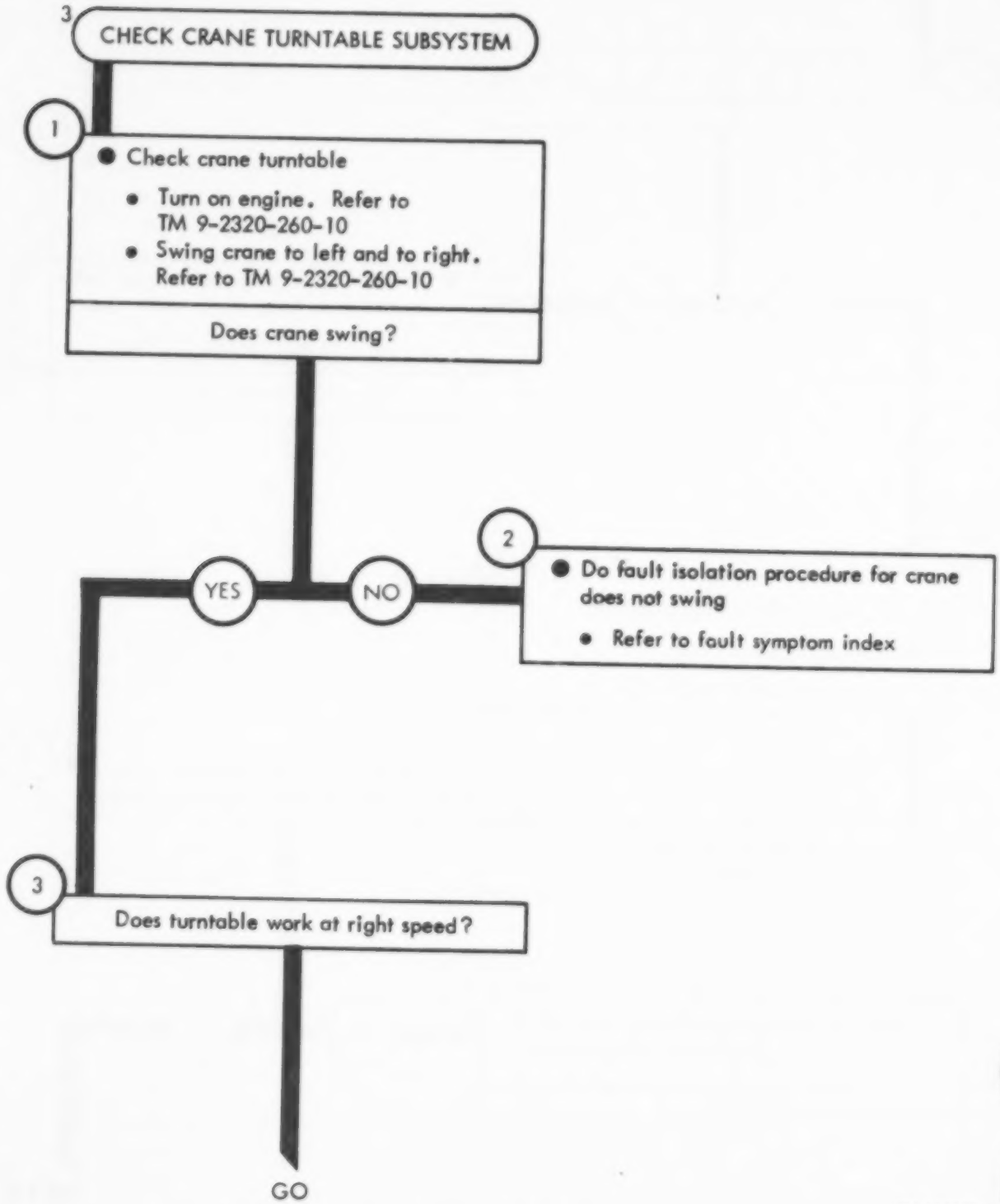
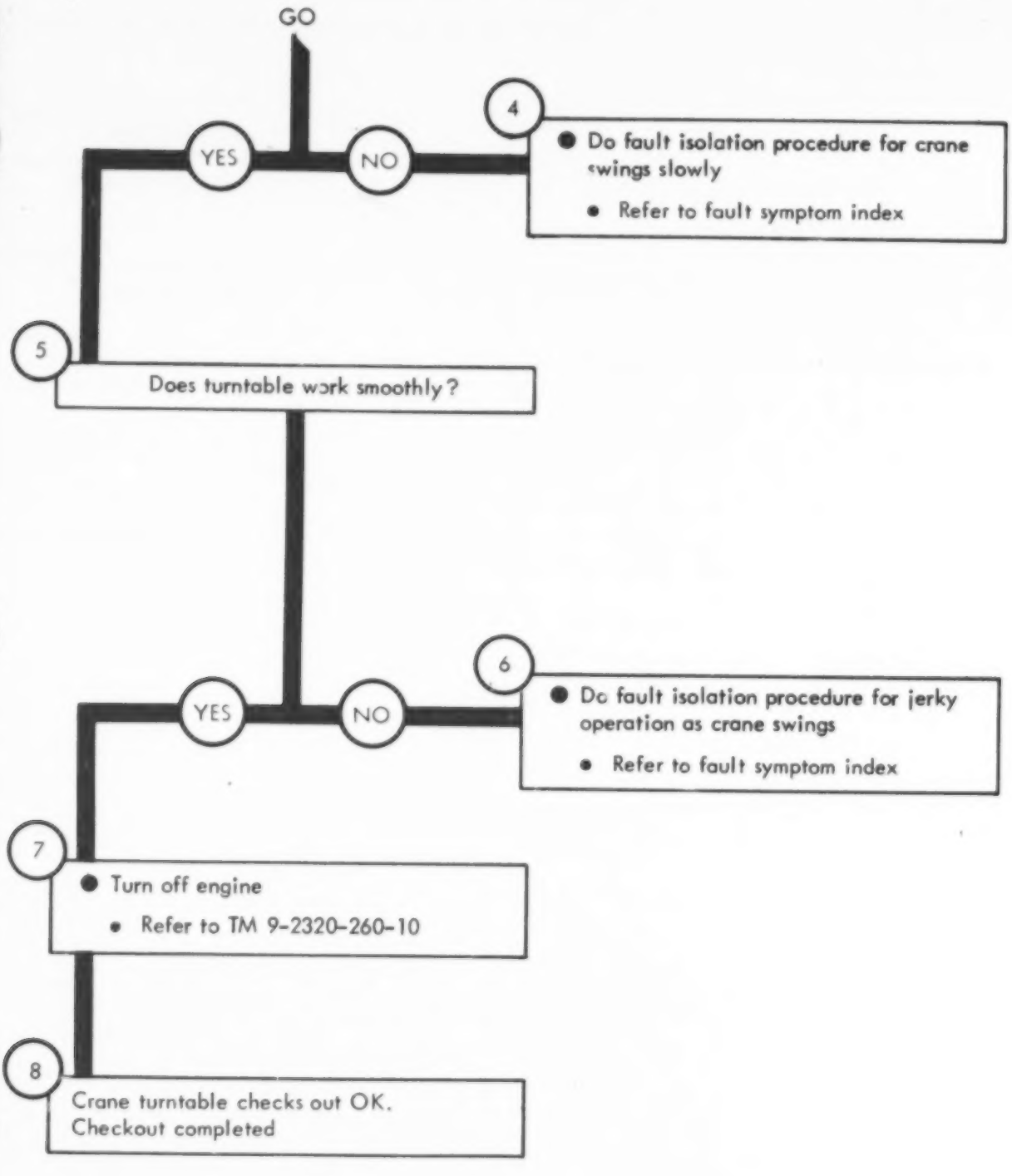


Figure 42-2 (Sheet 1 of 2)



TA 118437

Figure 42-2 (Sheet 2 of 2)

By Order of the Secretaries of the Army, the Navy, and the Air Force:

E. C. MEYER
General, United States Army
Chief of Staff

Official:
J. C. PENNINGTON
Major General, United States Army
The Adjutant General

LEW ALLEN, JR., *General USAF*
Chief of Staff

Official:
VAN L. CRAWFORD, JR., *Colonel, USAF*
Director of Administration

Distribution:
To be distributed in accordance with DA Form 12-38 Direct and General Support maintenance requirements for 5-Ton Truck Chassis: 5-Ton 6x6, M809 Series.

☆U.S. GOVERNMENT PRINTING OFFICE: 1989 242-451/05080

RECOMMENDED CHANGES TO EQUIPMENT TECHNICAL PUBLICATIONS

SOMETHING WRONG WITH THIS PUBLICATION?

FROM (PRINT YOUR UNIT'S COMPLETE ADDRESS)
CDR, 1st Bn, 65th ADA
Attn: SP4 Jane Idone
Key West, FL 33040

DATE SENT
27 July 1980

PUBLICATION NUMBER	PUBLICATION DATE	PUBLICATION TITLE
TM 9-2320-260-34-1	15 June 1980	DIR. & GEN. SUPPORT TROUBLESHOOTING MANUAL

BE EXACT PIN-POINT WHERE IT IS

PAGE NO	PARAGRAPH	FIGURE NO	TABLE NO
6-3			6-4
8-2		8-1	
16-3		16-1 (Sheet 2 of 2)	

IN THIS SPACE TELL WHAT IS WRONG AND WHAT SHOULD BE DONE ABOUT IT:

Symptom 2, summary procedures refer to figure 17-2. Should refer to figure 17-1.

Change illustration callouts.
Reason: callouts for RETURN HOSE and MAIN PICK UP HOSE are reversed.

Box (4), eighth sentence reads "Push down on outer axle shaft." Should read "Push down on outer axle shaft until it rests on center ball."

SAMPLE

PRINTED NAME GRADE OR TITLE AND TELEPHONE NUMBER
SP4 Jane Idone Autovon 222-2224

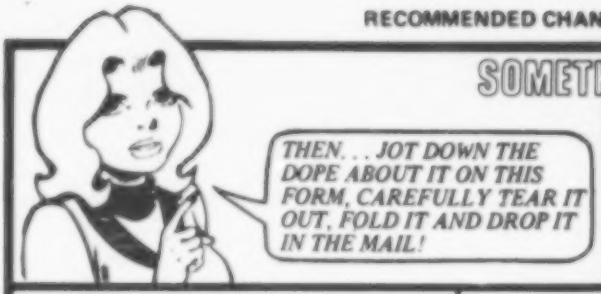
SIGN HERE
Jane Idone

DA FORM 1 JUL 79 2028-2

PREVIOUS EDITIONS ARE OBSOLETE

P.S.--IF YOUR OUTFIT WANTS TO KNOW ABOUT YOUR RECOMMENDATION MAKE A CARBON COPY OF THIS AND GIVE IT TO YOUR HEADQUARTERS

RECOMMENDED CHANGES TO EQUIPMENT TECHNICAL PUBLICATIONS



SOMETHING WRONG WITH THIS PUBLICATION?

FROM (PRINT YOUR UNIT'S COMPLETE ADDRESS)

DATE SENT

PUBLICATION NUMBER	PUBLICATION DATE	PUBLICATION TITLE
TM 9-2320-260-34-1	31 Dec 1980	DIR. & GEN. SUPPORT TROUBLESHOOTING "ANUAL

BE EXACT PIN-POINT WHERE IT IS

PAGE NO	PARA-GRAPH	FIGURE NO	TABLE NO

IN THIS SPACE TELL WHAT IS WRONG AND WHAT SHOULD BE DONE ABOUT IT:

PRINTED NAME GRADE OR TITLE AND TELEPHONE NUMBER

SIGN HERE

DA FORM 1 JUL 79 2028-2

PREVIOUS EDITIONS ARE OBSOLETE.

P.S.--IF YOUR OUTFIT WANTS TO KNOW ABOUT YOUR RECOMMENDATION MAKE A CARBON COPY OF THIS AND GIVE IT TO YOUR HEADQUARTERS.

REVERSE OF DA FORM 2028-2

FILL IN YOUR UNIT'S ADDRESS

FOLD BACK

DEPARTMENT OF THE ARMY

OFFICIAL BUSINESS
PENALTY FOR PRIVATE USE $300

POSTAGE AND FEES PAID
DEPARTMENT OF THE ARMY
DOD 314

U.S. MAIL

TEAR ALONG PERFORATED LINE

COMMANDER
U.S. ARMY TANK – AUTOMOTIVE
MATERIEL READINESS COMMAND
ATTN: DRSTA MB
WARREN, MI 48090

RECOMMENDED CHANGES TO EQUIPMENT TECHNICAL PUBLICATIONS

SOMETHING WRONG WITH THIS PUBLICATION?

FROM (PRINT YOUR UNIT'S COMPLETE ADDRESS)

DATE SENT

PUBLICATION NUMBER	PUBLICATION DATE	PUBLICATION TITLE
TM 9-2320-260-34-1	31 Dec 1980	DIR. & GEN. SUPPORT TROUBLESHOOTING MANUAL

BE EXACT PIN-POINT WHERE IT IS

PAGE NO	PARAGRAPH	FIGURE NO	TABLE NO

IN THIS SPACE TELL WHAT IS WRONG AND WHAT SHOULD BE DONE ABOUT IT:

PRINTED NAME, GRADE OR TITLE, AND TELEPHONE NUMBER

SIGN HERE

DA FORM 1 JUL 79 2028-2

PREVIOUS EDITIONS ARE OBSOLETE.

P.S.—IF YOUR OUTFIT WANTS TO KNOW ABOUT YOUR RECOMMENDATION MAKE A CARBON COPY OF THIS AND GIVE IT TO YOUR HEADQUARTERS.

REVERSE OF DA FORM 2028-2

FILL IN YOUR UNIT'S ADDRESS

FOLD BACK

DEPARTMENT OF THE ARMY

OFFICIAL BUSINESS
PENALTY FOR PRIVATE USE $300

POSTAGE AND FEES PAID
DEPARTMENT OF THE ARMY
DOD 314

U.S. MAIL

TEAR ALONG PERFORATED LINE

RECOMMENDED CHANGES TO EQUIPMENT TECHNICAL PUBLICATIONS

SOMETHING WRONG WITH THIS PUBLICATION?

FROM (PRINT YOUR UNIT'S COMPLETE ADDRESS)

DATE SENT

PUBLICATION NUMBER	PUBLICATION DATE	PUBLICATION TITLE
TM 9-2320-260-34-1	31 Dec 1980	DIR. & GEN. SUPPORT TROUBLESHOOTING MANUAL

BE EXACT PIN-POINT WHERE IT IS

PAGE NO	PARAGRAPH	FIGURE NO	TABLE NO

IN THIS SPACE TELL WHAT IS WRONG AND WHAT SHOULD BE DONE ABOUT IT:

PRINTED NAME, GRADE OR TITLE, AND TELEPHONE NUMBER

SIGN HERE

DA FORM 1 JUL 79 2028-2

PREVIOUS EDITIONS ARE OBSOLETE.

P.S.--IF YOUR OUTFIT WANTS TO KNOW ABOUT YOUR RECOMMENDATION MAKE A CARBON COPY OF THIS AND GIVE IT TO YOUR HEADQUARTERS.

REVERSE OF DA FORM 2028-2

FILL IN YOUR UNIT'S ADDRESS

FOLD BACK

DEPARTMENT OF THE ARMY

OFFICIAL BUSINESS
PENALTY FOR PRIVATE USE $300

POSTAGE AND FEES PAID
DEPARTMENT OF THE ARMY
DOD 314

U.S. MAIL

TEAR ALONG PERFORATED LINE

Commander
U.S. Army Tank-Automotive Command
ATTN: DRSTA-MB
Warren, MI 48090

RECOMMENDED CHANGES TO EQUIPMENT TECHNICAL PUBLICATIONS

SOMETHING WRONG WITH THIS PUBLICATION?

FROM (PRINT YOUR UNIT'S COMPLETE ADDRESS)

DATE SENT

PUBLICATION NUMBER	PUBLICATION DATE	PUBLICATION TITLE
TM 9-2320-260-34-1	31 Dec 1980	DIR. & GEN. SUPPORT TROUBLESHOOTING MANUAL

BE EXACT PIN-POINT WHERE IT IS

PAGE NO	PARAGRAPH	FIGURE NO	TABLE NO

IN THIS SPACE TELL WHAT IS WRONG AND WHAT SHOULD BE DONE ABOUT IT:

PRINTED NAME, GRADE OR TITLE, AND TELEPHONE NUMBER

SIGN HERE

DA FORM 1 JUL 79 2028-2

PREVIOUS EDITIONS ARE OBSOLETE.

P.S.—IF YOUR OUTFIT WANTS TO KNOW ABOUT YOUR RECOMMENDATION MAKE A CARBON COPY OF THIS AND GIVE IT TO YOUR HEADQUARTERS.

REVERSE OF DA FORM 2028-2

FILL IN YOUR UNIT'S ADDRESS

FOLD BACK

DEPARTMENT OF THE ARMY

OFFICIAL BUSINESS
PENALTY FOR PRIVATE USE $300

POSTAGE AND FEES PAID
DEPARTMENT OF THE ARMY
DOD 314

U.S. MAIL

TEAR ALONG PERFORATED LINE

Commander
U.S. Army Tank-Automotive Command
ATTN: DRSTA-MB
Warren, MI 48090

RECOMMENDED CHANGES TO EQUIPMENT TECHNICAL PUBLICATIONS

SOMETHING WRONG WITH THIS PUBLICATION?

FROM (PRINT YOUR UNIT'S COMPLETE ADDRESS)

DATE SENT

PUBLICATION NUMBER	PUBLICATION DATE	PUBLICATION TITLE
TM 9-2320-260-34-1	31 Dec 1980	DIR. & GEN. SUPPORT TROUBLESHOOTING MANUAL

BE EXACT PIN-POINT WHERE IT IS

PAGE NO	PARAGRAPH	FIGURE NO	TABLE NO

IN THIS SPACE TELL WHAT IS WRONG AND WHAT SHOULD BE DONE ABOUT IT:

PRINTED NAME, GRADE OR TITLE, AND TELEPHONE NUMBER

SIGN HERE

DA FORM 1 JUL 79 2028-2

PREVIOUS EDITIONS ARE OBSOLETE

P.S.—IF YOUR OUTFIT WANTS TO KNOW ABOUT YOUR RECOMMENDATION MAKE A CARBON COPY OF THIS AND GIVE IT TO YOUR HEADQUARTERS

REVERSE OF DA FORM 2028-2

FILL IN YOUR UNIT'S ADDRESS

FOLD BACK

DEPARTMENT OF THE ARMY

OFFICIAL BUSINESS
PENALTY FOR PRIVATE USE $300

POSTAGE AND FEES PAID
DEPARTMENT OF THE ARMY
DOD 314

U.S. MAIL

TEAR ALONG PERFORATED LINE

Commander
U.S. Army Tank-Automotive Command
ATTN: DRSTA-MB
Warren, MI 48090